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[OFFICIAL NOTICE.]

Thirty-Third Annual Meeting, American Gas Light Association.

AMERICAN GAS LIGHT ASSOCIATION,
OFFICE OF THE SECRETARY,
NEW YORK CITY, Sept. 15th, 1905.

There will be an annual meeting of the American Gas Light Association held at Milwaukee, Wis., October 18th, 19th and 20th, 1905. The meeting will be called to order by the President, Mr. E. G. Cowdery, of St. Louis, Mo., at 10 A.M., on Wednesday, October 18th.

The Plankinton and Pfister are both first-class hotels, and because neither can reserve sufficient accomodations for all visiting gas men, it has been thought best to mention neither as headquarters of the Association. The Secretary may be found at either the Pfister Hotel or Meeting Room.

Rates at these hotels as follows:

Plankinton—Will reserve 150 rooms. American plan, without bath, $3 per day and upwards; American plan, with bath, $3.50 per day and upwards. European plan, room without bath, $1.50 per day and upwards; European plan, room with bath, $2 per day and upwards.

Pfister—Will reserve 75 rooms. American plan, without bath, $3.50 per day and upwards; American plan, with bath, $4.50 per day and upwards; European plan, room without bath, $1.50 per day and upwards; European plan, room with bath, $2.50 per day and upwards.

Besides these there are several lower priced hotels: The Republican House, Blatz Hotel, Schliz Hotel, St. Charles Hotel, the Kirby House.

The roll call will be made by means of the door card system. Each member, upon entering the hall for the first time, will, at the door, receive a special card, upon which he will find his name, address, etc., as it appears on the Secretary's books, and such card should be corrected and given to the doorkeeper. Members in attendance should attend to this very carefully, as these cards are used immediately after the meeting for correcting the annual membership list. Visitors will please hand to the doorkeeper their personal cards.

A blank form of application for membership accompanies this circular. More can be obtained of the Secretary.

Remember, all applications must be in the hands of the Secretary by October 9th, at the very latest, otherwise they will not be acted upon at this meeting.

The list of papers to be read at the meeting is as follows:

"Condensation," by Mr. James S. McIlhenny, Washington, D. C.
"Taxation of Gas Companies," by Mr. Geo. McLean, Dubuque, Ia.
"High Pressure Distribution to Date," by Mr. H. L. Rice, Aurora, Ills.
"Methods of Charging for Gas," by Mr. A. E. Forstall, New York.
"Improvements to Date in Consumers' Meters," by Mr. Charles H. Dickey, Baltimore, Md.
"Municipal Ownership," by Mr. B. F. Lyons, St Louis, Mo.

The meeting on Thursday morning is expected to be opened by a lecture on the "Relativity of Economic Institutions," by Prof. B. H. Meyer, of Wisconsin University.

All members attending the meeting are particularly requested to wear their membership badges in plain sight, thereby greatly aiding the officers and local committee in their work by affording a ready means of recognition.

In order that the year book containing the report of this meeting may be published and issued to the members immediately after the meeting, notice is hereby given that if any of the speakers at this meeting desire to correct their remarks before they are printed, they will be given an opportunity before leaving Milwaukee, but not after. The stenographer will have typewritten copy of the principal discussions prepared at the headquarters between the sessions of the meeting, and all those who desire to correct their remarks must notify the Secretary at the close of the session at which such remarks are made, as all reports will be turned in to the printer immediately after the adjournment of the meeting.

Special rates for transportation hnve been granted (viz., full fare going and ⅓ returning by the same route) by the several passenger associations named and under the conditions noted.

The Trunk Line Passenger Association, covering the territory west of New England and east of Niagara Falls, Buffalo and Salamanca, N. Y.; Pittsburgh, Pa.; Bellaire, O.; Wheeling, Parkersburg and Charleston, W. Va.

The New England Passenger Association, covering nearly all the lines in the New England States, with the exception of the Eastern Steamship Company.

The Central Passenger Association, covering the territory bounded on the east by Pittsburgh, Salamanca, Buffalo and Toronto; on the north by the line of and including points on the Grand Trunk Railway from Toronto to Port Huron, thence via Lakes Huron and Michigan to the north line of Cook county, Ills.; on the west by the west line of Cook county and the Illinois and Mississippi rivers, to Cairo, including Burlington, Keokuk, Quincy, Hannibal and St. Louis, and on the south by the Ohio river, including points on either side of that river.

The Southeastern Passenger Association, covering the territory south and west of the Virginias and south and east of the Ohio and Mississippi rivers.

The Western Passenger Association, covering the territory of and not including Chicago, Peoria and St. Louis; in other words, the territory west of that of the Central Association and east of Cheyenne, Wyo., including all points in Colorado.

The Southwestern Excursion Bureau, for points in southern Missouri and southeastern Kansas.

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The following extracts from the regulations of the railroads are cited for the information of the members. The special rates are granted subject to these regulations:

1. The reduction is conditional on there being an attendance at the meeting of not less than 100 persons holding certificates.

2. Each person to obtain the excursion rate must purchase a first-class ticket (either limited or unlimited) to the place of meeting, for which he will pay regular fare, and upon request the ticket agent will issue a printed certificate of purchase of the standard form. Agents at all important stations are supplied with certificates, but it would be well to inquire of your agent in advance whether or not he has such certificates, so that he can obtain them if not already supplied with them.

3. If through tickets cannot be procured at the starting point, purchase short trip tickets to the most convenient point where such through tickets can be obtained, and there purchase through to place of meeting, requesting a certificate from the ticket agent at the point where each purchase is made. This certificate must be handed in to the Secretary as soon as possible after reaching Milwaukee, to be endorsed by him and the special railroad agent. Under the rule adopted by the passenger associations a charge of 25 cents is made for each certificate indorsed by the railroad agent, so that this sum must accompany each certificate handed in to the Secretary.

4. Tickets for the return journey will be sold by the ticket agent at the place of meeting at ½ the highest limited fare only to those holding certificates signed by the ticket agent at points where through ticket to place of meeting was purchased and countersigned by signature written in ink by the Secretary of the Association, certifying that the holder has been in regular attendance at the meeting, and by the special railroad agent present at the meeting.

5. No reduction of fare will be made on the return passage if the going ticket is purchased more than 3 days before the opening date of the meeting; except that when meetings are held at distant points to which the authorized limit is greater than 3 days, tickets may be purchased before the meeting in accordance with the limits shown in regular tariffs.

6. Certificates are not transferable, and return tickets secured upon certificates are not transferable. The transfer of any such is liable to prevent the securing of reduced rates for future meetings.

7. The certificate of agent at starting point, duly indorsed by the Secretary of the Association and special railroad agent, must be presented to ticket agent at place of meeting within 3 days (Sundays not reckoned) after adjournment of meeting. The return ticket will be for the line or lines covered by the going ticket.

8. No refund of fare will be made on account of any person failing to obtain a certificate.

The committee has under consideration several entertainment features, as follows:

Wednesday Night.—Deutscher Club. The building occupied by this Club, formerly the residence of Alexander Mitchel, is complete with café, dining rooms, large hall and other accessories, to say nothing of the grounds which, together with the building, occupy an entire block. It has been suggested for this evening that a genuine Dutch entertainment be furnished, and dancing if desired. This will include the ladies.

Thursday.—In the afternoon the ladies of the party may be driven through the parks, with a lunch before or afterward at the Golf and Country Club. The club house of the Golf and Country Club is beautifully situated upon the lake and will be a delightful place for the ladies to visit; they can then return to the hotel in time to dress for dinner and the theater in the evening. The play at the theater upon this night will be "The School Girl," a new comic opera. A banquet will be given to members and guests at the Pfister Hotel on this evening. It is the desire of the committee to make this an attractive feature by having a good dinner and good speaking afterwards. A lunch will be served the ladies after their return from the theater in the Ordinary of the Pfister Hotel.

Friday.—It has not been decided how this day can be most profitably spent, but the fotlowing is probable: Trolley ride to the National Soldiers' Home. Visit, upon invitation, to Pabst Brewery, where lunch will be served.

A trip to the new works of the Milwaukee Gas Light Company, and possibly to the works of the Semet-Solvay Company, and the great engine works of the Allis-Chalmers Company. These trips will be arranged so that members desiring to leave on the afternoon or early evening trains can do so, as return to the hotels will be made in ample time for this.

Be sure to obtain a railroad certificate when buying your ticket to Milwaukee. The greater the number of certificates handed in the easier it is to get the reduction in rates for future meetings, since the railroad officials count the certificates turned in as marking the full attendance. In our case, the number of certificates is from 50 to 100 less than that of the persons in attendance, and our requests for lower rates are not given the consideration they should receive. Apply for ticket and certificate at least 30 minutes before train time. Each person must sign his own certificate at time of purchasing tickets to Milwaukee. Be sure to hand the Secretary or his clerk your certificates, accompanied by 25 cents for each one, as soon as you reach headquarters. If there are 100 members present holding certificates, each certificate will then be promptly endorsed and handed back to the owner before adjournment. Apply for return tickets at least 30 minutes before train time, and have your certificates with you. All persons, ladies included, attending the meeting are entitled to the reduced rate from the territories named.

Any members having questions which they desire put in the Question Box should send them to the Secretary as soon as possible, in order to give him an opportunity to have them distributed to the members before the meeting, and thus secure for them careful attention.

GEORGE G. RAMSDELL, Secretary.

[OFFICIAL NOTICE.]

Wrinkle Department, Western Gas Association.

OFFICE OF EDITOR, WRINKLE DEPARTMENT,
WESTERN GAS ASSOCIATION,
182 WISCONSIN STREET, MILWAUKEE, WIS.,
June 27th, 1905.

To the Members of the Western Gas Association: Your early attention and assistance are earnestly solicited in connection with the above Department for 1906. We are now ready to receive contributions and any device, plan, scheme, wrinkle, suggestion, formula or new method will be warmly welcomed. A full description, with sketch or photo, should accompany each contribution. Give us your help to make the 1906 Wrinkle Department a success. Thanking you in advance for your kind assistance, I remain, Yours truly, B. MCADAM, Editor.

[NOTICE.]

Wrinkle Department, Ohio Gas Light Association.

OHIO GAS LIGHT ASSOCIATION,
OFFICE OF THE WRINKLE DEPT.,
719 CITIZENS BUILDING,
CLEVELAND, O., June 13, 1905.

The Wrinkle Department of the Ohio Gas Light Association is now ready to receive contributions for the 1906 collection, and a sketch or description of all devices, formulæ and methods of accomplishing objects pertaining to the gas business, is respectfully solicited.

Please send a written explanation, accompanied by any sketch, photograph or drawing, to the above address, or a description alone will suffice.

Hoping to receive prompt compliance,
Yours very truly. W. E. STEINWEDELL, Editor.

BRIEFLY TOLD.

NOTES.—

A FIRE that for a time threatened the huge tanks of the City Gas Company, Norfolk, Va., in High street, which contain several hundred thousand cubic feet of gas, was extinguished only after a hard struggle on the part of the entire force at the gas works, led by Superintendent R. J. Marks. It took 45 minutes of hard fighting to get the fire under control, and it was over 2 hours before the last of the fire was out. The gas company lays the blame on the men in charge of the city crematory. The fire had made its way to within 300 feet of the gas tanks.

THE sale of the plant of the Consumers Gas Trust Company, of Indianapolis, Ind., was postponed at a meeting of the Board of Directors of the Company. The sale had been set for September 11. No new date for the sale has been set. The postponement was considered necessary because of the appeal of the city of Indianapolis on the decision of Judge Francis E. Baker of the Federal Court, that the city's option of purchase, provided by the ordinance of 1887, is null and void. Several weeks will probably elapse before the case can be brought before the United States Circuit Court of Appeals, which usually sits in Chicago.

A WARRANT of attachment against property of the Pennsylvania Gas Improvement Company and Henry T. Duke, in Nassau county, N. Y., has been issued by Supreme Court Justice Dickey, directed to Sheriff Gildersleeve. It is to satisfy a claim against the parties named in favor of the First National Bank of Hempstead for $2,782.90.

A CERTIFICATE of incorporation of the Clyde (N. Y.) Gas and Electric Company was filed at the office of the county clerk yesterday. The Company is to replace the old company of the same name and is capitalized at $25,000 divided into 250 shares at $100 each. The duration is to be 50 years and the object of the Company is to manufacture gas and electricity for lighting, heating and power purposes. There are three directors elected for the first year: Thomas W. Summers, of Ithaca; George S. Sheppard and William T. Morris, of Penn Yan.

COLONEL J. M. GORE has purchased the Nevada, Mo., water works, gas plant, electric light plant and electric street car line.

PLATTVILLE, Wis., wants someone to build it a gas plant.

FOURTEEN bond salesmen in the employ of N. W. Halsey & Co., of New York, who took the issue of the Western United Gas and Electric Company, of Elgin, Ills., accepted an invitation from Manager Strohn of the local branch to visit the gas plant. Halsey & Co. are sending their men all over the gas system with a view to educating them as to the different properties on which they are to sell bonds. Howard G. Stillman, formerly of the engineering staff of the Milwaukee Gas Light Company, has been appointed Superintendent of Distribution for the entire system. P. O'Malley is the new General Superintendent of works.

[Continued from page 449.]

THIRTEENTH ANNUAL MEETING, PACIFIC COAST GAS ASSOCIATION.

HELD IN MECHANICS INSTITUTE, SAN FRANCISCO, CAL., JULY 18, 19 AND 20, 1905.

SECOND DAY—AFTERNOON SESSION.

The President—The afternoon session will be opened by hearing a report of the Committee appointed to consider the suggestion of Past-President Aldrich, in reference to the Gold Medal matter, concerning which Mr. Aldrich wrote us a letter, and which you heard read at the opening session of the Association.

The Secretary—Such of the members as were not here at the time the letter was read, may not recall the subject matter of the letter. In that letter Mr. Aldrich suggested that a Gold Medal, upon the general plan of the Beal Medal of the American Gas Light Association, be tendered by award of a Committee, to any member presenting at any particular meeting, a paper of sufficient originality and merit to warrant, in the opinion of the judges the award of the Medal, not necessarily that a medal should be awarded every year, but only upon the presentation in any one year, of a paper of merit. In the American Gas Light Association, I believe as many as 3 years have elapsed where medals have not been awarded. Your Committee has just concluded its conference, and have not had time to present a written report, but the unanimous opinion of the Committee was that the Gas Association of the Pacific Coast should award such a medal, and that it should be upon the lines of the award of the Beal Medal in that it should only be given to such person as would present a paper of originality in its matter applicable particularly to the Pacific Coast and to this Association. That medal should be of sufficient value, not less than a value of $100 to warrant competition for it; that the Committee to award the medal should be composed of the then President and Vice-President of the Association, the Secretary, and one member from the general body, not an officer, being selected by the 3 named. It is thought that it would promote a greater interest in the Association's affairs, and greater interest particularly to our own affairs on the Pacific Coast, and be an incentive to the members who have not yet awoke to the fact that they may become famous by contributing to the list of papers. Therefore, your Committee recommends that a Pacific Coast Gas Association Medal be instituted and awarded by the Committee named in any one year when a paper of original merit, in their judgment, has been presented.

On motion of Mr. Kirk, the report of the Committee was unanimously adopted.

The President—This, I presume, will commence with the next annual meeting, and the Secretary will so communicate with Mr. Aldrich.

The Secretary—I do not believe I stated that it was the intention of the Committee, and it was to be so carried in my report, that the Medal was to be furnished from the funds of the Association, and not by private subscription.

The President—You will remember, however, that Mr. Aldrich offered to subscribe towards the Medal fund, and there is no intention to keep anyone from a subscription of that nature, if they wish to make it.

The Secretary—The Medal is not in the nature of a transitory Medal; that is, to be given to a man this year, and as is sometimes the case, presented the year afterwards to another person; but it is to be a permanent Medal, to be kept by the person to whom it is awarded.

The President—We will now listen to Mr. George C. Holberton's paper, entitled,

SOME SUGGESTIONS ON OPERATION AND CONSTRUCTION IN THE ELECTRIC DEPARTMENT.

During the last few years the writer has had occasion to visit a great many gas and electric plants in towns scattered over 300 miles of this State and varying in size from a population of say 110,000 down to 1,000 or less, and to note their methods of operating and constructing.

In no two places are conditions absolutely identical, but there are a great many general suggestions that would apply to all and possibly some of these suggestions, ideas, rules or whatever else you may choose to call them may prove of interest to you.

Meters.—A great many of our California towns are supplying current on a flat rate basis, but in all of them there are at least a few meters. I do not care to enter into a discussion of the relative merits of meters and flat rates, but would like to try and give you a few suggestions as to the selection and care of meters.

There are two general classes of meters, commutator type and induction type. The use of the induction type is confined to alternating current, but the commutator type can be used on either direct or alternating. For ordinary use, especially where there are not a great many meters, the induction meter is to be preferred, as it will remain accurate over longer periods with less care than the commutator type.

Assuming then that in general we use induction meters, we now come to the selection of the particular meter best suited to each case. I do not here refer to the make of meter, as I am not in the advertising business, but to the general type.

For ordinary lighting work and for single phase motors, a simple single phase meter, either 2 or 3-wire as may be required, should be used, but when it comes to polyphase motors there is room for discussion. I think that for 2-phase motors it is probably better to use two single phase 2-wire meters. This form of registration will be accurate, and should you lose your motor customer your two meters become available for lighting or other purposes. Also, should one meter stop, twice the registration of the good meter would give you an approximate registration. As to the relative cost, take for example a 15-horse power, 200-volt 2-phase motor, we find that two 50-ampere meters would cost say $45, and a polyphase meter would cost the same, so there is no advantage from this point of view in favor of the polyphase meter. The main advantage would be that of having in the case of the polyphase only one dial to read and take care of on the books.

In the case of a 3-phase motor there are three possible arrangements: One polyphase meter, three single phase meters and two single phase meters. I believe the first of these is to be preferred. The second is more accurate, but is too expensive and too complicated except in very large installations.

The third case is all right under some conditions, but with a low or varying power factor gives rise to trouble. In 1903 Mr. Decker gave us a very interesting paper on "Our Customers and their Complaints," and told what to do when they kicked about high bills. Since then Mr. Decker has had two meters on a 3-phase motor in a planing mill, and perhaps he can tell us what to do, when at the end of the month the meter showed that he owed his consumer something for the privilege of operating his mill during the month.

Even in large installations the poly-phase meter will be found almost as accurate as the 3 meters and much more simple to read and keep track of. I think the reason it is not used more than it is, is mainly that it is hard to get out of San Francisco stock, where the small 2-wire meters can almost always be obtained.

There is one other point in the selection of the proper type of meter that I would like to touch on, and that is the use of the so-called primary meter. That is to say, a meter in which the primary (2,000-volt) current actually passes through the meter. These meters should never be used under any circumstances. If you have a contract with a consumer which calls for the measurement of his 2,000 or 4,000-volt current, use ordinary 5-ampere 100-volt meters with both current and potential transformers, even if his primary current is so small that your current transformer has a ratio of 1:1. This also applies to switchboard work, as I believe it is generally conceded that no current over 600 volts should be brought to instruments or switches on the face of the switchboard. In fact, the writer is now designing a sub-station where no current over 600 volts even enters the same room as the switchboard, except the one lead coming up through the floor to the sychronous motors of the motor generator sets.

Having discussed the character of meter to be employed I would now like to bring to your attention the matter of the proper capacity. In a general way from my observation I feel perfectly safe in stating that 90 per cent. of the meters in the average town are installed too large. This subject has been brought up in a great many articles on the care and management of meters. All these articles treat the matter in a general way. In order to impress on you the importance of this matter, I propose to give you a specific instance showing how meters are sometimes installed. The following is an actual existing condition in a small California town:

The company owns a total of 72 meters, 9 of which are in their warehouse for either stock or repairs and the balance of 63 are on their lines. Of these 63, twelve are used for power, leaving 51 lighting meters. The records of 4 of these were not quite clear as to the size of meters or number of lights connected, leaving 47 meters of which there was a complete record.

The total number of lights in the equivalent of 16-candle power lamps connected to these meters is 1,255, whereas the total capacity of these meters in 16-candle power, burning continuously, is 2,670. That is to say, if all the lights connected on the meters were to be turned on at once and left burning continuously, the capacity of the meters would

still be more than double that necessary to carry the load. As a matter of fact, however, all lights are rarely turned on at once, and also a meter is capable of standing quite a considerable overload, so that there really exists a still greater discrepancy between the capacity of the meters and the number of lights installed than that herein noted.

There are two great objections to this condition of affairs. First, the fact that the accuracy of registration, that is to say, all night registration, is greatly impaired, and secondly, the fact that you have an unnecessary investment. Concerning the first objection, I think it is evident to us all that the nearer the normal load the meter is worked the better the registration; also, if, as is often the case, 1 or 2 lamps are left burning, the smaller the meter the more chance of getting registration of this extremely light load. The writer has in most cases been able to install house meters as to get registration of what is known as the baby filament in a Hylo or Edison night lamp without having a meter that crept.

Regarding the second objection, would state that the value of these 47 meters is approximately $590.50, whereas the value of a properly selected batch of meters to do the work would be about $476.50, showing an over-investment of more than 25 per cent. So much for the selection of the proper meter, we now come to the method of installation.

In all the larger companies, I believe it is the general practice to test the meter as received before installing same in its location on the consumer's premises. In the case of smaller companies it would be well to at least, after unpacking the meter, examine same very carefully and make an approximate test, making sure that the meter is approximately correct and free from any great defects. Care should be used in transporting meters from the storeroom to the consumer's premises. Modern meters are so constructed that it is no longer necessary to wedge the disks with wooden or paper wedges as this is taken care of by more simple methods; but even so, it is better to exercise care in transporting the meters. It is also of great importance to see that the meters are located in a proper position on the consumer's premises. In selecting this location, there are 3 main points to be observed. First, the meter should be so located as to get good registration, that is to say, it should be located away from any vibration, dampness, or undue amounts of dirt and dust. In the second place it should be so located as to be readily accessible for testing and cleaning, and third, it should be located where it is easily read.

It was only a few years ago that it was quite common to see the statement taker with a step-ladder on his shoulder going his rounds to read electric meters. In fact, the writer has seen a great many instances where the meter was located in bathrooms and other inaccessible places, making it necessary for the statement taker to make several trips owing to the cleanly habits of the occupants of the house.

In Oakland we are having a very rigid system of inspection. Service is not connected to a house unless a meter loop is located in a position approved by the company's inspector. This is generally on the back porch within 6 feet of the ground or in the case of a house having a high basement it is often located in the front end of the basement and a door cut in the side of the house opposite the meter, so that the statement taker has only to enter the front yard, open the door and read the meter, the high basement making the meter readily accessible for cleaning and testing. After the meter is properly installed it should not be assumed that it needs no further care. The meter should be tested when installed, after which it should be periodically inspected. The frequency of these tests and inspections depends upon the character of the installation. Both the conditions under which the meter is installed and the revenue derived therefrom tend to determine its factor.

In the larger towns under the writer's supervision we make two distinct classes of inspection. One class is the taking care of suspicious meters—that is to say, meters where either the registration has stopped, fallen off or very materially increased, or where the customer has complained of the amount of the consumption. The other class of inspection is a periodical one and covers all meters whether they show any suspicious registration or not. The condition of the meters when inspected will soon demonstrate the period which may be allowed to elapse between inspections. We find some meters need a very frequent inspection due to vibration, all of which cannot be overcome and which tends toward inaccuracy of the meter, particularly in the commutator type of meters. In larger towns, however, where there are many meters, a great deal of discretion should be exercised in the character of the test made on the meters. For instance, it is clearly evident that in meters whose registration is below the minimum bill, it would be a waste of time to attempt to make the meter register within a fraction of 1 per cent., whereas in large meter installations, of which the writer has one installation showing an extreme condition, where the bill amounts to in the neighborhood of $12,000 per month, it is necessary to get the most accurate registration possible. In this case, were the meter even ¼ of 1 per cent. slow, it would pay the meter inspector's salary if he did nothing else but watch these meters all day long. These meters are watched continuously and kept in perfect order and elaborate tests are made every few months, and where there is the slightest falling off in the reading, unless there is some good reason for such falling off, they are made oftener.

To test these large meters and get them within a fraction of 1 per cent. requires a great deal of care and time as well as very accurate and expensive instruments. For testing the smaller meters this extreme accuracy and care is unnecessary. A man whose bill is $2 or $3 a month is not very apt to complain even if the meter is 5 per cent high, whereas it is very easy to adjust a meter within 1 per cent. and to test a great many a day.

The writer, with the assistance of Mr. Knopp, who has charge of the meter department in Oakland, has devised a testing set for use in testing small meters, which is very easily and rapidly manipulated. Our weekly meter test reports show that one man working 8 hours a day will test about 15 meters, including the time for connecting and getting from place to place; also including the adjustment of the meter and the putting of same in good condition.

Thinking some of the members might be interested in this test set, I have brought one here for your inspection. The outfit is extremely simple, consisting of an ammeter and a portable load with a variable resistance for taking care of the different voltage found from house to house, or at different times of the day. In all meter formulæ you will generally find the constant 3,600, representing the number of seconds in an hour. This causes a complication in figuring the exact speed of the disk. To overcome this Mr. Knopp has made a watch in which the gears have been changed so that the watch reads directly in what he styles millihours, that is to say, 1,000 part of an hour. By measuring the speed of the disk in millihours you eliminate the constant 3,600; also by properly adjusting the load to the calibrating constant of the meter, you can use the meter disk to make revolution, when accurate in 100 of the watch divisions (10) millihours. All that is necessary is to take the speed of the disk with the stopwatch, and if the watch reads 96 of these divisions in place of 100, $\frac{96}{100}$ becomes the correct factor of the meter. In other words, the meter is about 4 per cent. fast, and this actual reading multiplied by $\frac{96}{100}$ will give the correct reading of the meter. On the other hand, if the disk makes a revolution of 104 divisions, the meter is approximately 4 per cent. slow and the reading of the meter should be multiplied by $\frac{104}{100}$ to get the correct reading. The instrument is also so constructed that in a 4-hole meter only two wires are removed and the only operation is that of slacking off two set screws and slipping the instrument connectors into the meter in place of the house and service wires and then placing the house and service wires into these connectors.

We have also a more elaborate testing set which is used for testing where extreme accuracy is wanted and where we have to test various types of meters, including polyphase meters and those covering wide ranges. This set will test meters having a capacity of from 5 to 200 amperes and voltages from 100 to 500. This instrument is also on exhibition if you care to inspect same.

I should, perhaps, apologize for taking up so much of your time on the meter business alone, but I feel that this is a very important matter in connection with the supply of electricity, as a very small error in your meters will make a very large difference in the revenue of your concern.

In this connection there is just one other experience which might interest you, and that is a case which came under the writer's observation. There were installed a number of old-style meters which had been in service for some years. The writer removed from one plant about 150 of these meters at a cost of about $1,000, including the labor of making the change. The result was that where consumers had been paying the minimum bill of $1 per month, their bills jumped to $2 and $2.50, and where bills have been running along at $1.50 and $2 per month, the bills increased to $3 and $4 per month. It does not take a very large sheet of paper to figure the advisability of discarding such meters.

Kind of Service.—Leaving now the matter of meters, I would like to offer some suggestions in connection with the character of service, that is to say, as to the kind of service best suited for secondary distribution in the smaller towns, also in the residence and outlying districts of the larger towns. In 1901 the writer read a paper on "Comparison of Methods of Secondary Distribution of Alternating Current," in which

he advocated the use of 200 volt service supplied from a 3-wire secondary with 400 volts across the outside, the service being connected between the outside and the neutral. Since the reading of that paper the writer has had 4 years' experience in Oakland in the installation of 200-volt service, and I would state that outside of a few 3-wire, 260-volt services installed in the congested downtown district of Oakland, nothing but 200-volt services have been placed. We have no tronble whatever in obtaining lamps, fans and other appliances and the installation in a number of ways has been a perfect success. We do not always run the 400-volt 3-wire secondaries at the start, but often run a straight 2-wire 200-volt distribution; then as the district grows and we get a sufficient number of consumers we run the third wire and balance up the load. This has resulted in an immense saving in copper and transformers, the copper being $\frac{1}{4}$ of what it would be for 100 volts, and it has enabled us to use much larger transformer units than could otherwise be used; also the saving in meters has been considerable. A small 200-volt meter, such as is used in residences, costs 80 cents more than a 100-volt meter of the same ampere capacity, and is good for twice the number of lamps.

I trust that it will be your pleasure to discuss these points as the writer is of the opinion that this practice should be universally adopted in the smaller towns and outlying districts of larger towns as above mentioned.

I had intended to take up a number of other subjects such as pole-line construction, type of transformers, etc., but I find that the paper has already become longer than I anticipated at the start, so I will not tax your patience further. If this paper invites some discussion I shall feel rewarded for my efforts and will in another paper, at some future date, be glad to offer some suggestions along other lines covering different portions of the electric end of our business.

Discussion.

The President—Gentlemen, you have heard a very interesting paper. There are many of you, who, in addition to being gas men are electric men—a great many have electric plants under their supervision, and doubtless you will be very glad indeed to seek Mr. Holberton's advice. The paper is now open for discussion.

Mr. Sterling—I have been very much interested in Mr. Holberton's 3-wire system in Oakland, and there is one question relating to it that I never understood—the question of running the 400 volts inside of the building, in case of a large installation, and wired on the 3-wire system, whether the underwriters will take the 4,000 volts on just a 2-wire service.

Mr. Holberton—We always use a 2-wire service and never have run a 3-wire.

Mr. Hill—I would like to ask Mr. Holberton if there is any objection to the use of your primary meter outdoors, set on a pole out of reach of everyone except the company's employees.

Mr. Holberton—I will answer that by saying that we have no more desire to kill our own men than anybody else. In one or two instances, a line or regular employee sent out to take statements, and perhaps finding something wrong with the meter, thought he would take the current off, and was hurt. The expense of making it the other way is very slight, probably costs less than the regular 5 ampere meter, and a current transformer if you don't have to insulate your transformer for over say 4,000 or 5,000 volts. It would cost you less that way than with the primary meter.

Mr. Hill—I would like to ask Mr. Holberton what he considers a safe overload for the indicating meter.

Mr. Holberton—I do not hesitate at all to give a meter 100 per cent. for a short time; that is to say, take a 10-ampere 100-volt meter, and you might class it as a 20-light meter—you may just as well turn on 40 lights on it, but not for a long period.

Mr. Jones—The other day I went over to Oakland, and I saw an electric meter on a throne, with a fence around it, and there was a placard on it saying, "This Meter is Alive." I inquired what it was, and it seems it was one of these primary meters. The company's men have great respect for them.

The President—If there are no further questions on this paper, we will pass to the next one, which will be the

QUESTION BOX,

prepared by Mr. E. C. Jones.

Mr. Jones—Before I undertook the editorship of the Question Box, I did not realize to what length it might grow, and to-day, this Question Box, I fear, would be extremely tiresome to the members should I attempt to read every question and every answer, and call for discussions; however, I believe that no answer to any question should be allowed to stand, if any member present feels that it is not true; if his experience teaches him that any of these answers are incorrect, I will feel very much indebted to him if he will make it known, so that it will be a matter of record. The questions were sent to the Editor by the members of the Association, and the answers were not trumped up, but were provided by the members of the Pacific Coast Gas Association, so that it has been a mutual exchange by the members.

"What difference does it make in operating a gas plant if the unclean gas is stored in the holder until needed, and then purified out through the boxes to the street mains, instead of first purifying it into the holder and then out to the street mains?"

Answer.—On a small scale, none, providing plant is built with that object in view. On a large scale, objection would appear, due to the uneven rate of purification occasioned by the heavy night output.

At the time, each day, of greatest consumption, the purifying boxes would not be equal to the task; if it became necessary to cut out all of boxes, dirty gas would be going into the mains.

Among the disadvantages of such a plan would be: The exhausters, purifiers and station meters would have to be equal to the maximum hourly output.

The gas would be purified at too low a temperature.

Temporary stoppage of the exhausters would result disastrously.

The pressure at the outlet of the works would be very difficult to regulate.

"Is it possible by the use of too much cold water in wash box and scrubber to cool the gas beyond the temperature of the proper extraction of tar and lampblack in the scrubber by Lowe crude oil set?"

Answer.—It is not advisable to use cold water in contact with the hot gas in the wash box, as too violent scrubbing with cold water, while the gas is hot, is apt to condense hydrocarbons which, under proper treatment, would remain in the gas as illuminants which give candle power. It is best to have a lampblack separator so arranged that clarified warm water may be pumped from it back to the wash box, using the cold water for the first and second scrubbers. An ideal arrangement would be the gradual lowering of temperature of the gas until it reached between 60° and 70° F. at the storage holder.

No. But the use of too much cold water in the wash box would result in making the washer do much of the work that could be done in the scrubbers.

With a wash box proportionate to the amount of gas being made, it is not possible.

"Is it not bad practice to have a steam jet exhauster between the scrubber and the purifier?"

Answer.—The principal work to be performed by the steam jet exhauster is that of ejecting gas; that is, receiving the gas at the inlet at a comparatively low pressure and, by the propulsive effect of the jet of steam increasing the pressure of the gas at the outlet. By the use of a steam jet exhauster the gas becomes saturated with water vapor, and this water vapor upon entering any piece of apparatus at a lower temperature, condenses into water and precipitates with it naphthaline and some other hydrocarbons. It is, therefore, a disadvantage to have the steam jet exhauster at the inlet of the purifiers, as such precipitation is apt to destroy the oxide of iron, and there is always a liability of naphthaline stoppages on the under side of the layer of oxide. It is better practice to have a steam jet exhauster between 2 scrubbers, thereby condensing the steam in the second scrubber without diminishing in any way the effect of the exhauster for forcing the gas through the purifiers.

"What would be the effect of placing steam exhaust between wash box and scrubber in the Lowe crude oil gas set?"

Answer.—It would saturate the light particles of lampblack that escape the washer, but would result in stopping up the pipe very quickly. I think it would not affect the gas in any way.

It would cause a deposit of naphthaline and lampblack in the scrubber.

"What should be the cubical contents of ordinary cylindrical scrubbers per 1,000 cubic feet of gas from 25,000 cubic feet maximum make per 24 hours?"

Answer.—Two-hundred and twenty-five cubic feet. This would be approximately a scrubber 5 feet in diameter and 10 feet high.

The size of scrubbers for a crude oil gas plant does not depend upon the gas made in 24 hours, but upon the gas made during 1 hour. To be more nearly correct, I should say it depends upon the gas made per minute during the time of actual gas generation. For practical purposes, however, the hourly make during actual operation is a satisfac-

tory basis for estimation, and I should say that a minimum of 80 cubic feet per 1,000 cubic feet of gas made per hour would be a safe rule.

There should be 3 scrubbers, each of which has the same cubic contents as the actual cubic contents of the generator inside the brick lining.

"If it were possible not to burn any of the oil to lampblack when making gas in the Lowe process, how much more gas would 10 gallons of oil yield?"

Answer.—The making of lampblack in the oil gas process is an advantage, as the crude lampblack is worth more per ton for any purpose than the original oil costs. The incandescent lampblack in the superheater and generator yields a small quantity of carbonic oxide when brought into contact with dry steam. If 10 gallons of oil is used for making gas, the oil weighs 81 pounds, the gas derived from this oil weighs about 34 pounds, and the lampblack produced weighs about 30 pounds, so that only 17 pounds of oil is used for heating the machine. It will be seen at once that the process is much more economical than any coal or water gas method of making gas, and while it is not possible to burn the oil without obtaining lampblack, and it would not be desirable were it possible, the diluent gases, hydrogen and marsh gas are obtained by the destructive distillation of the oil, leaving the lampblack, which is almost pure carbon, as a by-product.

"Which would be more advisable and economical; to put in a relief holder, or duplicate the generator in a Lowe crude oil water gas set with a 30,000-foot holder; plant running above holder capacity?"

Answer.—It would be economical to put in a relief holder for good clean gas and good results per 1,000 cubic feet of gas made; but, from the standpoint of safety against shut-downs for repairs, duplicate the gas generating apparatus.

Since your plant is running above holder capacity, the installation of a relief holder would be the more desirable and, in the end, economical. The best practice, of course, would be the installing of both the generator and holder. If the 30,000-foot holder is large enough to meet all requirements, except when it is necessary to repair the generator, and the matter of future increase is not considered, then the duplicate generator should meet requirements and would be the most economical to install.

"Is an installation of two relief holders as satisfactory for measuring gas as a station meter?"

Answer.—If the gas is properly cooled before entering the relief holder, yes.

"Is an excessive blast pressure (above 12 inches to 14 inches of water column) desirable in crude oil gas making?

Answer.—In large units of the Lowe type, where blast passes through the machine in the opposite direction from that of the gas, I have seen cases where a heavy blast (28-inch water column) was beneficial in blowing out the particles of carbon between runs. I believe, however, that a large volume of air at the lower pressure is better far most types of oil gas machines if they are handled with proper care. This gives a more uniform heat throughout the machine, avoiding local hot spots.

"Raw gas leaving the washers on the way to the relief holder is of a dark brown color, but after standing awhile in the holder becomes clear. What is this color and what becomes of it?"

Answer.—The brown color of raw gas is due to the presence of vapors—watery and tarry. In short, the gas contains a fog of moisture and tar; when the dew point is reached, precipitation occurs. As it has been aptly remarked: "It rains in the holder."

This brown color is due to suspended tarry matter in a state of extremely fine subdivision. Tar formed in retorts or machines is precipitated as the gas is cooled, condensers and scrubbers removing the larger drops; the finest particles can only be removed by contact with solid bodies; for instance, by repeatedly passing through fine orifices and baffling against plates. These finer particles settle out of the gas on standing and accumulate below the water in holder pit. Tar thus recovered is black, thin and contains more oil and naphthaline and less pitch than condenser tar, but is usually rich in free carbon. The accumulation is extremely slow.

"In pumping gas from a relief holder to a storage holder in crude oil gas making, is there any choice between a positive exhauster of the type made by the Roots Company and the Connersville Blower Company, and the fan exhauster such as that made by Sturtevant?"

Answer.—I have seen a positive exhauster stopped absolutely solid so that it was necessary to take off the sides to cut away deposits of hard asphalt. This could not happen with a fan exhauster from the nature of its construction. I therefore prefer the fan exhauster.

"If compressed air is used for testing pipe and fittings in distributing systems which are operated at a maximum of 15 pounds, what pressure will give a most satisfactory test?"

Answer.—From 40 to 50 pounds pressure. Leaks which develop under the operating pressure will show up at 40 to 50 pounds, while this test pressure will not unduly strain and weaken either the pipe or the fittings.

My experience is that 100 pounds is the most satisfactory test.

Sixty pounds air pressure.

"Would like to know if pressure blowers (Sturtevant type) are used in water gas plants; if not, state reason?"

Answer.—So far as I know, there has been no demand for a blast pressure in excess of that delivered by the "Sturtevant Monogram Blowers" in the double superheater water gas process.

Pressure blowers of the Sturtevant type are not generally used in water gas plants, the object of a blower in a water gas plant being to secure as large a volume of air as may be necessary with such pressure as the conditions of generator fuel bed calls for, a moderation of the so-called volume blower has been found best adapted to water gas purposes.

Under certain conditions of operating, I believe a pressure blower could be used to advantage. For example: Where anthracite coal, such as was used on the Coast some years back, particularly Welsh anthracoal, a heavy pressure is required to force the air through the fuel bed, and while great volume would be required here, a heavy pressure is also necessary, consequently under these conditions a larger pressure blower would be preferred to the usually smaller volume blower. Where coke or an anthracite coal more homogeneous than the Welsh is used, a modification of the volume blower would be preferred, the object being as stated to obtain a large volume of air under moderate pressure with a minimum expense of power.

"What is the best method of testing pipe and fittings for a distributing system which is to operate a maximum of 15 pounds?"

Answer.—The questioner does not state the character of pipe and fittings or conditions to which his question applies. This would plainly have an important bearing upon the method of testing.

Generally speaking, compressed air is the quickest, cheapest and most satisfactory test.

In entirely new installations the compressor ultimately intended for the gas distribution can be used on air and the pipe laying begun at the works.

A pressure is then maintained on the mains the entire time the work is in progress and is controlled by valves at suitable intervals. It is generally conceded that high pressure systems should be equipped with valves at all crosses, or at least so placed that comparatively small districts may be cut out.

If valves are not used, or the districts are very large, the above method is rendered impracticable; neither can it be applied in the case of main extensions.

Under the valve system, when mains must be extended, the testing can usually be done quite satisfactorily with gas by simply raising the street pressure by means of the compressor so as to insure a reasonable safety factor. The governors will take care of the temporary increase in pressure, so that the consumers along the line will not be affected.

Where the conditions are such as to render it impossible to obtain the necessary pressure either of air or gas from the works, a small gas engine air compressor outfit mounted on a wagon may be employed, similar in every respect to that used by the compressed air cleaning companies or the sand blast concerns now familiar to all of us.

A portable outfit of this sort is simple to operate and not expensive. The pipe and fittings can then be made up in lengths to suit the conditions and subjected to test before going into the trench.

A system to be operated under a maximum of 15 pounds should be made tight with very little trouble. By the use of proper material in the first place, by a careful inspection of same, particularly the threads, before making up, and by the exercise of care and intelligence in laying, the leakage specter will disappear.

In general, the best method of testing pipe and fittings is that which most nearly approaches the conditions under which they are to be used.

Dry compressed air. Pipe and fittings which show no leaks under test with water or other liquids in many cases will not prove tight when tested with 5 pounds air pressure.

I would say, "compressed air."

Test each length of pipe separately before placing in the ditch. Two hundred pounds kerosene oil is a good test for this purpose. Test each fitting to at least 60 pounds air pressure and apply soap and water to the

entire surface. Sand holes are numerous. After pipe is made up in the ditch, test to at least 60 pounds air pressure and apply soap and water mixture to joints before back-filling ditch. If possible, allow pressure to stand for several hours before back-filling, as the test will be more satisfactory by so doing.

"Why does the presence of a trace of unsaturated hydrocarbons inhibit the reaction between phosphorus and oxygen?"

Answer.—The phenomenon seems not to have been explained up to the present time, although it has been long known that traces of certain hydrocarbons, notably ethylene, prevent the reaction between phosphorus and oxygen. I quote the following from Winkler and Lunge, Technical Gas Analysis, 1904 edition, page 69:

"The presence of certain gases and vapors retard or even stop in a hitherto unexplained way the oxidizing action of oxygen on phosphorus. Perhaps this phenomenon is of a similar kind to the 'paralyzing' action of minute quantities of hydrogen sulphide, carbon disulphide and other foreign substances upon the catalytic action of platinum and of organic ferments, as observed by Bredig and Muller von Berneck (Zech f. physik Chem. 1899, p. 324.)

"Among the substances interfering with the absorption of oxygen by phosphorus are, according to Davy, Graham and Vogel, hydrogen phosphide, hydrogen sulphide, sulphur dioxide, carbon disulphide, iodine, bromine, chlorine, nitrogen peroxide, ethylene, acetylene, ether, alcohol, petroleum, oil of turpentine, eupion, creosote, benzene, tar and many essential oils. How strong this influence may be is shown by the fact that as little as 1/1000 vol PH_3, 1/100 vol. C_2H_4 1/4444 vol. oil of turpentine suffices for making phosphorus and oxygen indifferent to each other. Hence the application of phosphorus as an absorbent for oxygen is restricted and is excluded in all cases where the presence of such disturbing substances is to be assumed with any degree of certainty. But according to experiments made by O. Brunck, at Freiburg, these substances can in most practically occurring cases be removed by a previous treatment of the gas with fuming sulphuric acid, so that this enables the analyses of illuminating gas and that of firedamp to be made by that means. This proves the incorrectness of the assumption hitherto held, according to which methane and ethane belong to the class of interfering surfaces, as these are not removed by the treatment with fuming sulphuric acid."

"The method in question renders excellent service in the examination of air, of chimney gas, vitriol chamber gases, etc.; for, generally speaking, phosphorus is superior as to certainty and speed of action to every other reagent for the absorption of oxygen. Lindemann (Zsch. f. Analyt. Chem., 1879, p. 158) has greatly facilitated the practical use of this reagent by the construction of a special absorbing apparatus."

It has long been well known that phosphorus has an affinity for hydrocarbons, and this affinity appears to be greater between phosphorus and unsaturated hydrocarbons than between phosphorus and oxygen. In general, hydrogen is more easily dissociated from its compounds than heavier gases from their compounds. It is also a chemical truth that in any group of three compounds, one of which is capable of combining with either one of the other two, there will be a selective preference,

In taking up oxygen, phosphorus is compelled to break up the molecules of oxygen to form either P_2O_3 (phosphorus anhydride) or P_2O_5 (phosphoric anhydride), while an unsaturated hydrocarbon might give up its hydrogen easity to the phosphorus to form PH_3 (phosphene). The following results were obtained from a gas known to contain not to exeeed 2 per cent. of oxygen. The gas was passed into the potassium hydrate pipette, and $3\frac{5}{10}$ per cent. of carbon dioxide was extracted. After this, the gas was passed directly into the pipette containing phosphorus, with the following results:

After 25 minutes	.7	per cent.	loss	
" 57 minutes	.8	"	"	"
" 2 hours, 27 minutes	.8	"	"	"
" 4 hours, 27 minutes	.9	"	"	"
Making a total of	3.2	per cent.	loss	

by exposure to phosphorus. I believe that phosphorus combined with the hydrogen of the unsaturated hydrocarbons to form phosphene in preference to breaking up the oxygen molecules.

"Oxide, after being used one or two years and is then thrown out into the atmosphere and exposed to the sun and air for another year or so, appears to be thoroughly revivified. Can this same oxide be used again?"

Answer.—Oxide of iron properly used is only required to purify gas that has been previously freed from all tarry matter, oil, vapor in suspension or in the case of coal gas, of ammonia. When great care is used, the only limit to the life of oxide of iron is the percentage of free sulphur which it contains. This may reach as high as 60 per cent. before the purifying action of the oxide is so weakened as to make it necessary to renew it. In many cases, where oxide of iron is removed from purifiers as spent oxide, its usefulness as a purifying material has been destroyed by the tar and oil. Such oxide, upon being exposed to the air and rain, will become cleansed and assume the reddish color of new oxide. This work, performed by the elements, may be accomplished in a few hours by washing the oxide with lime water while still in the purifier. The only reliable test to determine when oxide of iron is unfit for use, is to determine the amount of free sulphur contained in it. This is done by washing out the sulphur in a weighed sample of oxide by means of carbon disulphide. An inexpensive apparatus used for washing grease from wool, is the simplest and best means of dissolving out the sulphur.

"Are there any gas retorts made from other materials than iron or fireclay that are a success?"

Answer.—I know of no gas retorts made from other materials than iron or fireclay that are a success. Of course, there are sometimes materials other than fireclay added in the manufacture of gas retorts. Some manufacturers add a certain proportion of pure silica, the fireclay, which is mixed with it, acting as a binder; but these retorts are known as fireclay retorts. As a rule high grade fireclay contains sufficient amount of free silica in its composition, so that pure silica does not have to be added, and it is very difficult to add pure silica in proper proportion to form as good retorts as where it is originally contained in the composition of the fireclay coming from the mine.

"What has been found best for tees and crosses on high pressure pipe lines?"

Answer.—Those constructed after the "Dresser idea," because the ordinary fitting does not admit of the force used on the line socket in screwing up.

"What has proven in practice the best and most economical coupling for high pressure pipe lines, all things considered?"

Answer.—"The line socket or coupling" with beeswax and tallow mixed as a lubricant, using a power winch for setting up joints instead of pipe tongs or wrench devices, expanding the joint by friction, thereby concealing the threaded ends within the joint, making a strong, durable and tight coupling and a time economizer in installation, and consequent dividend winner by preventing the loss of a marketable commodity.

"What is the proper way by which to designate the openings of reducing tees and crosses so that no mistake can arise in ordering such fittings?"

Answer.—In ordering reducing tees, it becomes necessary to name the run and outlet. Such a tee is read 2x1¼ inches. The run is read first. In ordering tees that reduce on the run, we say 2x1¼x1¼ inches. Whenever both ends of the run are of the same size, but having the outlet larger, such a tee is called bull head and is read 1¼x2 inches. It will be seen that when a tee reduces on the run, we will have three figures to specify; whereas, if a tee reduces on the outlet, we have but two figures to indicate. Thus, in tees reducing on the run, we have ¾x¾x¼ inch; reducing an outlet, we have 1x¾ inch.

In like manner, in ordering crosses, we must be particular about stating the size of outlet or run. A very important rule about crosses is as follows: The outlets of a cross are always of the same size, and indicated by the last figures. A cross 1¼x1¼x1 inch, shows the oatlets are 1 inch, while the run is 1¼x1¼ inches. It should be remembered that crosses are read on the run first and, when reducing on the run, we have three figures to mention; when reducing on the outlets we have two figures to indicate.

"Is it common practice to use leveling instrument in grading the bottom of pipe trenches to secure an even surface for pipe to rest upon?"

Answer.—As a matter of observation, generally the bottoms of trenches do not receive the attention they deserve in harmony with good work, and many leaks are due to settling strains, while otherwise the pipe has been well put together. A wholesome supervision is needed over this branch of installation that is generally overlooked to the company's detriment.

"What materials other than lead or cement can be used to connect the ordinary cast bell and spigot joints together so as to make a pipe line gas tight?"

Answer.—Iron borings and sal ammoniac (called rust joints) have been used but are now discontinued. Sulphur also has been used, but in many instances it has split the sockets of the pipe. A new material, called leadite, is now used to some extent. This material melts at almost 400° F. and is poured into the sockets as thin as oil. The joint is made in the ordinary way, first caulking in the yarn and then pouring in the leadite. A 4-inch joint requires about 2½ pounds of leadite. The advantages claimed for this substance are that it makes a tight

joint without caulking, and will withstand a pressure as high as 100 pounds to the square inch.

In my experience, covering nearly 40 years, I have not seen any material used, either by myself or others, in connecting ordinary cast iron bell and spigot pipe but Portland cement or soft lead. In fact, I am inclined to rule out the Portland cement, as the space allowed for cement in ordinary cast iron pipe is not usually sufficient to allow a proper joint to be made. If it were designed to use Portland cement on a pipe line to be gas tight, the alteration could be made in the bells when ordering the pipe.

"Which is better for pipe joints—graphite and boiled oil, or red lead and oil?"

Answer.—The material used for making pipe joints depends entirely upon the purpose for which the pipe is to be used. For pipe joints intended for low pressure gas, where the joints are to be broken from time to time, graphite and boiled oil is good. If the joint is to be made for low pressure work and will not be disturbed, red lead and oil is good. Pipe joints on oil lines should be made with copal varnish. This forms a glassy joint which is permanent and is impervious to all kinds of oil, including the naphthas. Brown soap is also used for screw joints for oil pipes. Another good oil joint is black oxide of manganese finely ground and mixed with orange shellac. Alcohol is used for thinning this preparation, and when this joint is made the shellac sets quickly and the joint should not be disturbed. This also applies to copal varnish joints. For high pressure steam joints, smooth-on packing gives excellent satisfaction.

Red lead, for a great many years past, has been used almost exclusively by pipe fitters for making up joints. It sets readily and makes a hard, durable joint and is a protection to the metal. Graphite and oil makes a tight joint for some purposes and is easily taken apart. For all-around work I think red lead and oil is the best.

My experience is that red lead and boiled oil makes the best joint.

"1. Under what conditions would you place a prepayment meter?"

"2. Is not the chance of the attachment becoming useless as great as that the consumer will repudiate the bill?"

Answer.—1. Often, by request of the consumer, especially where gas stoves are in use. As with some, the sight of a gas bill stops digestion, creates a dyspeptic and a consequent growler, to the detriment of the gas company. Pleasant relations between collector and consumer are always desirable.

2. Most decidedly not. On the other hand, collections are oftentimes increased from two to fourfold from the improvident who are unmindful of collection day, but do slip in the necessary quarters in the prepayment meter. Also, the pessimistic customer is in a great measure deprived of his expletives about robbing corporations and thieving monopolies. His collections are made more pleasant by the company's representative. Fault, if any, is in making the cash received compare with the gas statement turned in, for in many cases the consumer places in the magazine the limit ($2.50), when in reality he has consumed say 50 cents' worth of gas by the time the statement is taken, or in other words, has paid in advance, so in that way bothers the bookkeeper while benefiting the company by an increase of revenue.

2. A remedy for this has been suggested by one of our members who has instructed his collectors to remove from the prepayment meter only the amount of money actually due the company for gas consumed, leaving in the meter any excess of coin which belongs to the consumer until its value in gas has been registered by the meter.

1. Whenever a prospective consumer demanded one; when consumers gave much trouble in collecting account, when there were frequent changes of tenants in flats.

2. There should be no chance for the attachment to become useless, unless tampered with for the purpose of "beating the meter," consequently the consumer cannot consistently repudiate the bill; and if he did it would not avail him, as we would collect the difference between the cash in the box and the reading of the meter, or cut off the supply.

1. If no deposit is exacted, then in premises where tenants are frequently changing or when requested by consumer. If deposit is exacted, then when requested by consumer.

Another answer suggesting a most valuable use for the prepayment meter reminds us of Passe Partout in the old story of "Around the World in Eighty Days." Many families close up their houses in the summer time preparatory to leaving for the country. All are in the hack ready for the start. Some necessary article is forgotten; house is re-entered and on account of darkened rooms the gas is lit. The article is found, time is limited to catch the train. Gas forgotten, house locked, curtains down, blinds closed, trip begins for a 3 months' vacation. With a prepayment meter the gas company requires no mortgage on the house to secure payment for gas consumed during days and nights of that vacation. The prepayment meter faithfully guards the interests of both by extinguishing the light in due time, and the consumer and gas company remain friends.

"Is there any way to stop or reduce vibration on high pressure regulators? Where the initial pressure in the gas main is from 15 pounds to 20 pounds the regulator vibrates when using the gas and rattles so badly as to make a very disagreeable noise?

Answer.—I did a little experimenting to get a valve to vibrate but was unsuccessful. I loosened the valve seat, changed the amount of gas going through, put water in the inlet and did everything I could think of to make it vibrate, but was unable to do so. I had two complaints of this kind about a year ago. I had the governor changed in each case, which stopped the trouble. The valve seat being loose is the only reason to which I can attribute the cause of vibrating, as I used to have the same trouble with some compression facets in the plumbing business, and a loose seat was the cause of their working the same way.

A dash pot on valve stem arranged to retard the motion of valve, will usually stop pulsation. This is sometimes done with a loose fitting piston moving in a cylinder filled with oil, also by throttling the flow of fluid in the controlling diaphragm.

High pressure regulators will not vibrate when properly constructed. When such vibration occurs, it is due to inherent defects in the design of the regulator and cannot be stopped or reduced. The only remedy lies in a change of design so as to avoid the conditions which invariably produce the effect complained of.

A regulator which vibrates under any of the ordinary conditions of usage should not be tolerated by gas companies. It should act silently and positively, and should deliver gas to the meter at constant low pressure, say 3 inches of water, under inlet pressures ranging from 1 to 50 pounds gauge.

Reliability under varying conditions of pressure at the inlet is the first essential, otherwise the regulator fails of its purpose.

"Are free services to the property line a success?"

Answer.—Free services to the property line must be a partial success, but all gas companies should provide free services from their mains to the meters with free meter connections in order to give their customers the ordinary service supplied by tradesmen, where the smallest parcels are delivered promptly and without charge to the most remote parts of cities. Milkmen would find little demand for their commodity if the customers were compelled to furnish the cans for its delivery, and gas companies should not expect to sell gas and satisfy its consumers until they deliver their commodity through a good size service pipe and a meter amply large to measure the gas without pulsation.

My answer is yes. In fact, I would say that free services from main to meter are a success.

The general custom of laying services to the property line without charge has not proved the success contemplated, and is not considered an inducement by prospective consumers. Especially is this conclusion justified by those residing in rented houses, who are not disposed to pay for improvements on property not owned by themselves. I have observed that many companies are selling gas ranges at cost and less than cost; they had by far better lay services free, thus placing the means of using gas, selling ranges at a fair profit and by small monthly installments, which we have demonstrated to be a great success, as we are increasing at the rate of nearly 100 (to be exact, 98) consumers per month since March of this year. Our increase this month of 32 per cent. gas used by consumer's meters over the corresponding month of last year, I ascribe largely to free services to those living in rented houses, and I heartily commend the plan as a splendid investment for gas companies, especially where it is desirable to increase the day send-out.

"Does a diminished flow of gas, due to trapped service, increase a consumer's gas bill?"

Answer.—Not directly, but owing to the inefficiency of gas burners for lighting, and stove burners, the consumer usually lights many more burners than would be necessary if the service were satisfactory, with the result that the consumer's bill is increased by the multiplicity of smaller flames. It is also true that low pressure on a gas stove requiring a greater amount of time to perform a given amount of work, is wasteful.

Will say, at first glance, yes. Reducing the flow of gas will take longer to do the same work, during which time the efficiency of the reduced flame will not be as high while a given article is being cooked. In practice, I would say that a reduced pressure at the gas stove burner

from any cause will not increase the consumer's gas bill; in fact, I believe it is a common mistake in practice for most people to use too much gas while cooking. The frying pan, the oven and broiler need a good pressure, and a brisk, hot flame for their work; and unless a good pressure and supply of gas is given these burners, the cakes, biscuit and bread will be bought at the baker's, close by, and the head of the house will try and get along with stewed beefsteak until a post mortem is made by the gas company. In conclusion I would say that wherever the flow of gas is diminished, from any cause, an indifferent amount of cooking is done, and the consumer's bills will be less.

No and yes. If a consumer used gas for lighting with open tips, a trapped service will make no difference in his bill; but if gas is used for cooking, you cannot get as good results with a poor service, due either to a service being trapped, or a partial stoppage from other causes. The amount of differences depends altogether on the condition of the service and the pressure it will maintain when in use.

Second, the gas log unquestionably causes a circulation of the atmosphere of the room. The air is then brought into more or less intimate contact with the water and vapors rising from it. This water body and vapor curtain would exercise a powerful freshening effect on the atmosphere by the absorption of impurities which rapidly accumulate when a number of persons are confined in a room without thorough ventilation. It would therefore relieve to some extent what is generally termed the "closeness" of the room.

The heat from the burner produces sufficient vapor to moisten the atmosphere, without which the air would be dry and the heat oppressive.

"What is the most satisfactory radius for pipe bends?"

Answer.—In laying out piping equipments, the dimensions given below will be found satisfactory, and can be obtained more promptly than where other radii are used:

Size of bend—inches	2½	3	3½	4	4½	5	6	7	8	9	10	12	14	15	16	18	20	22	24
Radii recommended—inches	12½	15	17½	20	22½	25	30	35	40	45	50	60	70	75	80	108	120	132	144
Shortest length of straight pipe necessary on each end—inches	4	4	5	5	6	6	7	8	9	11	12	14	16	16	20	22	24	28	32

"A consumer claims he has greatly reduced his gas bills by raising the burners on his range to make a shorter flame. Is there not a point worth considering here, and should burners of different size all have the same space between them and the cooking utensils?"

Answer.—I would state that, in my opinion, the distance between an ordinary hot plate or range burner and the utensil, should be 1¼ inches; between the giant burner and the utensil, 1½, and between the simmer and utensil, 1 inch; and for all other sizes in like proportion. The distances mentioned allow for the proper combustion, and should not be varied.

I think that if a stove is properly adjusted to suit the pressure of the gas supply, it will be found that the burners of a first-class gas range are set about right. The space between the cooking utensil and burner is figured at a certain pressure by stove manufacturers; any variation from this pressure will necessitate the changing of the gas inlet and air mixer. If the gas pressure is exceptionally low, it may be advisable to raise the burners a little.

The burner on a gas range being what is known as a Bunsen burner, has, as do all Bunsen burners when properly adjusted, a zone of intensest heat, and, it seems to me, that if this point of the flame could be applied to the utensil, the best results would be obtained. As this zone of intense heat, or, in other words, the height of the Bunsen flame, would vary under the different pressure under which the gas is delivered to the Bunsen, and also vary with the different quality of gas, as well as in the many different kinds of gas, in order to meet the requirements under these very different conditions, a burner would have to be so made that it could be raised or lowered as desired, which would complicate the construction of the range top so as be beyond the understanding of the average consumer, and it would be difficult for the manufacturer to adjust burners to a height to meet these different requirements, as this would necessitate a complete stock of ranges for each variety of gas used.

The gas stove manufacturers adjust their burners, so far as possible for local conditions, making burners adapted for coal gas, water gas, oil gas, or natural gas, and will, if given the necessary data, adjust their burners to any pressure desired. As pressure, however, on any systems, with the possible exception of high pressure systems is variable as to length of line and elevation, no gas company can state just what pressure they desire the burners adapted for. It has, therefore, been customary for manufacturers to place their burners at a height to conform to average conditions, and they will probably be compelled to do so until all gas companies, or the majority of them, adopt the high pressure system for distribution with regulators reducing to a standard house pressure.

"What effect is there on the atmosphere of the room from water in pan under the burner of the Backus and similar grates?"

Answer.—The effect would be twofold. First, the water pan is in such close proximity to the flame that a considerable evaporation of the water is produced. This evaporating effect is enhanced by the arrangement of a light cast iron front plate or "lower log" across the front of the heater; the upper edge being about on a level with and very near to the flame, and the lower edge dipping into the water. Evaporation is probably induced by a capillary action of the rough surface of the warm iron combined with the heat of the gas flame. This tends to keep the atmosphere of the room heavily charged with moisture.

"Given the analysis of an illuminating gas, how may one determine its specific gravity?"

Answer.—Multiply the volume percentage of each constituent by its respective specific gravity, add the products, and the sum divided by 100 will be the specific gravity. The illuminants must be calculated as ethylene. The reason for dividing by 100 is obvious.

Gas.	Per Cents.		Sp Gravity (Air=1000).		
CO_2	5.0	×	1.529	=	7.645
$C_n H_{2n}$	10.0	×	.9374	=	.9674
O_2	0.1	×	1.1056	=	.11056
CO	25.0	×	.9674	=	24.18500
H_2	33.9	×	.06926	=	2.347914
CH_4	20.0	×	.556	=	11.120000
N_2	6.0	×	.97137	=	5.828220
	100.0				60.910694 ÷ 100 = .609

(To be Continued.)

[Translated and Compiled by Mr. Frederic Egner]

A Note from the XXXV. Annual Meeting of the German Gas and Water Business Men's Association.

The proceedings of the meeting of this Association, which was held at Coblenz last summer, were reported in full in the *Journal für Gasbeleuchtung*, to which source we are indebted for our information. The Association named consists of individuals and representatives of municipalities and companies interested in the gas and water business of the German Empire and of representalives of 8 branch Associations in the same territory. Its membership is of a somewhat different character from that of our American technical associations, as here each member represents himself only, whereas in the German Association the member represents his company, city or firm as well as himself. In the list of members we find, for instance, A. B. Slater, Jr., Consulting and Constructing Gas Engineer, Boston, U.S.A. In that order the membership consists of 1 honorary member, 789 members and 169 associates. The General Secretary of the Association is the distinguished Dr. H. Bunte, Professor of the Technical High School of Karlsruhe, who is also the publisher of the *Journal für Gasbeleuchtung und Wasserversorgung*, noted for the most scholarliness of its publication. From an Association constituted as is this "German Gas and Water Business Men's Association," for that is the correct translation of its title, instead of "Gas and Water Engineers" as we sometimes see it written, much could be justly expected. And those who were favored so as to be in position to attend the meetings, or who have been able to obtain and study the "Proceedings" as officially published, have been rarely if ever disappointed.

The thoroughness of research on any question brought before that Association and referred then, as usual, to "Commissions" appointed for the purpose, is seldom equalled and never surpassed by any other professional confederation. Further, never have any star-chamber methods been indulged in, and this German Association gave the results of its scientific and often very valuable labors freely to the world by publication in the organ of the Society (the German "Journal" previously named), about the same as our own Western or New England Association of Gas Engineers always have done.

It was, therefore, a matter of surprise and disappointment when, at the latest of its annual meetings, the 45th, this great Association got somewhat into the position of "the mountain in labor that ended in the bringing forth of a mouse;" proportionately not much better than that. It came about in this way: Two years ago, at the meeting held at Zurich, the suggestion for establishing a testing station on behalf of the Association was made. It was pointed out, as the General Secretary (Prof. Bunte) stated, that they had no means to investigate and pass upon the commercial value of gas coals, and it would be a task worthy of the Association to provide an experimental works to supply this long felt want. Accordingly the following year, based upon the resolutions adopted at the Zurich convention, a proposal was submitted recommending the establishing of an experimental gas works to be erected adjoining the Municipal Gas Works at Karlsruhe, and to be partly operated in connection therewith and also with the celebrated Technical High School at said city.

After a very lively debate in which Dr. Bunte did not participate, the proposal submitted by the Board of Directors and the Special Committee was adopted. The usual "commission" was appointed to carry into effect the wishes of the Association, which reported the results of its labors at the recent meeting. From said report it will be seen that the Commissioners were not idle. They did precisely what has been done by several committees of our American Gas Associations. They issued a circular letter to members and others interested or likely to be benefited by the proposed measure, pointing out its scope of operations and present and hoped for resources, ending with an appeal to aid the measure, and not to let the few who to date had borne most of the expense of scientific research undertaken by the Association for the welfare of all continue alone unaided in this undertaking, which must and could not fail to add to the general prosperity. Incidentally we got an insight into the sources of revenue upon which the Association had hitherto been able to draw. It appears that a number of gas companies and municipalities had voluntarily paid sums fixed upon the self-assesed annual sales of gas, for the purpose of aiding scientific research, not just as "dues," but more on the order of our own American Gas Light Association's Educational Class Fund. The sums contributed were found to average about as follows: Companies or corporations selling over 700,000,000 cubic feet of gas per annum, paid $125 · those selling from 350,000,000 to 700,000,000, $50 to $75; from 105,000,000 to 350,000,000, $25; from 35,000,000 to 105,000,000, $12; and less than 35,000,000 cubic feet per year from $2 50 to $7.50 per annum. But a great number did not pay at all but were willing (just as we find many here) to be free lunch customers.

Prior to the general call of the Commission a sum equal to about $3,155 had been pledged to be paid annually for the support of the proposed experimental works, but the circular letter brought an additional subscription of about $3,072 per year; while many had not yet replied to the call, but were expected to respond "when administrative conditions admitted," as the commissioners very kindly and considerately put it. The contributors were divided into 5 classes, viz.: Corporations selling over 700,000,000 cubic feet of gas per year (as in the classification already mentioned), which class pledged $2,500; the next class, selling less than 700,000,000 and more than 350,000,000 cubic feet, promised $1,012; following which those who sold less than 350,000,000 but over 105,000,000 agreed to pay $1,441; those who disposed of less than 105,000,000 but more than 35,000,000, $983; and finally, those who sold less than 35,000,000 cubic feet per year, pledged $291 per annum, and as stated (something like during one of our great national elections), a number of districts were still to be heard from. On the strength of the pledged and promised support plans were matured for the proposed plant, and the Commission reported that before the coming winter they confidentally expected to have the buildings ready at the least. The estimated cost is as follows; Buildings $10,000, apparatus $3,875 and laboratory with necessary details, $3,625. The ground upon which this "Educational and Experimental Institution for the Manufacture and Application of Gas," which is the official designation of the new venture, is to be erected, was leased to the Association by the Municipality of Karlsruhe for the term of 25 years, at an annual retal of 25 cents. It is located adjacent to the Eastern gas works of said city; which also agreed to take all gas or other products of the experimental works at market prices, and to permit them to take and use such material as may be wanted at the station on the same terms.

But the municipality did more than this. Since the experimental works could not offer facilities for demonstrating on a large practical scale some of the questions which were likely to arise, free access to and use of the large works near it, belonging to the city, were provisionally granted also. With *that* notable assistance on part of the city of Karlsruhe, which is in all probability due to the efforts of the celebrated though extremly modest, General Secretary of the Association, the "mouse" of the latter begins to assume really respectable proportions.

But unless some corporation had acted in the liberal manner of the authorities of Karlsruhe, which is the capital of the Grand Duchy of Baden and the official residence of the Grand Duke, together with the efforts of Dr. Bunte, the action of the Association, though greatly to be commended, would have amounted to little, since a mere testing station with a bench of two retorts and accessories however perfect, it must be admitted, would scarcely "fill the bill" of expectations gendered by the elaborate preliminaries on part of *such* a representative Association. Evidently human nature is the same in Germany as elsewhere. The average mere capitalist cannot be made to understand that lack of liberality is often the worst kind of injudicious economy. Dr. Bunte, however, is quite sanguine of ultimate results, and with such assistants as Dr. Eitner, who is to have direct charge of the Institute; Prof. Drehschmidt, and the hearty co-operation of all the eminent engineers who are members of the Gas and Water Business Men's Association, these may safely be expected to be of a high order, and to advance the science of gas making and application of gas materially, so that in the end capital will yield more substantial recognition than the paltry (in consideration of the lofty object to be attained) $6,227 at present at the command of its advocates and promoters.

The retort room will be 32.8 by 32.8 feet in the clear, by 22.9 feet high, from floor to tie-rods of roof. At present there will be placed in it 1 bench of 2 retorts, but it is hoped eventually to add a water gas generator and perhaps an oven with vertical retorts; but *that* depends on the materialization of hoped for greater appreciation and consequent liberality of the gas industry in general. The balance of the apparatus is calculated to take care of a maximum production of 17,640 cubic feet per 24 hours. Evidently, the expected water gas apparatus is to be a very small one, or else not expected to be operated many hours out of the 24. Of course, the auxiliary apparatus can be increased, when some of the "participaters" loosen their heart, I mean purse strings, and then give the disinterested and real workers an out-and-out fair opportunity to show what good such an experimental and testing works can do.

If this article should bring the desirable usefulness of such a plant before our American Gas Associations sufficiently to encourage measures and means for practical emulation of our transatlantic fellow craftsmen, this will not have been written in vain. The writer would feel amply repaid for the effort.

The Gas Makers of Japan.

By "Traveller."

Since my return to America, gas manufacturers have asked me questions relative to the process of gas making in Japan, and as to the prospects of the introduction of gas making machinery into the promising Empire of the new Japan. Japan will no doubt boom in all its manufacturing industries now that peace is established. With the closing of the present struggle the new problems of progress deeply concern the Japanese. They are aware that the industrial and scientific worlds are watching them. They know that while they are well qualified in the arts of war, and possess some of the most modern devices with which to conduct war, that their artisans still pull the plane backward, and saw boards full length by hand, and accomplish by manual labor much that other nations do with machinery. We look for some great improvements in the manufacturing and industrial worlds of Japan during the next year or two, and the gas making industry will get its share. It was my privelege to travel in and out among the Japanese workers last year, while the war was in progress. I found some very crude systems of making gas. In nearly all cases the proprietors of the gas making plants inquired about American apparatus for making gas according to up-to-date ideas.

Your correspondent made sketches of some of the crude arrangements of the Japanese for making gas, as seen in the provinces. If one has a mind to confine his investigations to some of the foreign gas making institutions located in some of the large cities and towns, he will find considerable apparatus of foreign design and construction, in charge of men who were brought there for the purpose. But, as a rule, the gas making of the country is done with the hand constructed devices of native planning and erection. Fig. 1 is a sectional view of one of the arrangements erected like a mound, cone shape, in which wood, coal and earth form the parts. First the furnace-like affair is arranged

for, by using fireclay, sand and common loam. The foundation is first put up, and then the placing of the tiers of wood begins, as shown. On top of the wood heap is piled the coal. The arrangement is such that the wood forms a hollow basin for the coal. A sheet metal stack *A*, is set up, and then the mound is completed with its top. The wood is ignited and as the flames reach the coal, the gas fumes generate and are carried out through the pipe *A*. A catch-pipe, tunnel shaped, is adjusted to this stand pipe in such a way that the gases are caught and conveyed to tanks. Sometimes the arrangement is as in Fig. 2. The retorts are arranged on platforms near the mounds.

Some of the retorts are imported, and if understood by the workmen, give good results. Other retorts are of home manufacture. The tar wells are sunk into the earth about 8 feet from the mounds. The condensers are exceedingly crude in design, except in cases where the devices are made in a foreign country and shipped to the Empire. I understand, however, that the ingenious metal workers of Japan have produced some very substantial condensers in recent years. using their own tools, designs and materials. The Japanese make good retorts of fireclay, although most of the imported ones are cast iron. I think that manufacturers of first-class retorts in America could find a good market for their output in the new Japan. I call it the new Japan, because when I first went to Japan, some dozen years ago, every artisan toiled and toiled hard with crude tools and mechanisms, and would listen to nothing concerning improved tools and devices. During

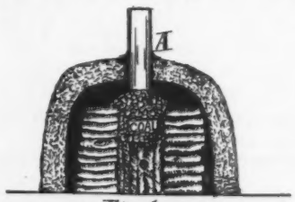

Fig 1.

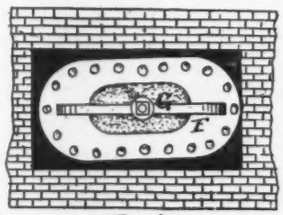

Fig 4.

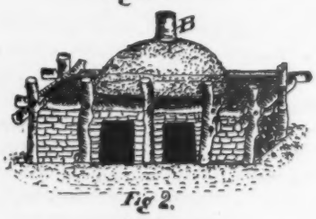

Fig 2.

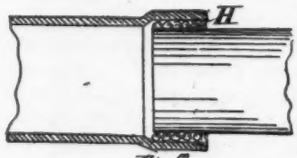

Fig 5.

Fig 3.

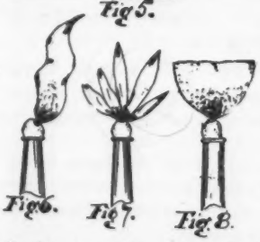
Fig 6. Fig 7. Fig 8.

my trip of last year I found a wonderful change. Now the people want devices and tools for doing away with so much manual labor. I found exhausters in service, of modern pattern, consisting of a pump driven by steam power in a few cases, but usually by a windmill, water wheel, or hand power. The exhauster lessens the deposits of carbon in the retorts. In the Japanese washer the gas is forced through water several inches deep.

Sometimes the device used for this work consists of a vessel filled with stones, straw, etc., through which the gas is forced in water. The mound in Fig. 1 is provided with a stack like that in Fig. 2. In Fig. 2 is a drawing of another system, in which brick is used for constructing the retorts. *C*, *c*, are openings, *e*, pipe, and *d*, the space below the grates. Fig. 4 is a drawing of one of the man-heads to a retort. This kind is used when the hole is of small size. The cap is marked *f*, and the bar for holding the cap flanges against the edges of the hole, with nut, are designated *g*. The mode of making a pipe joint by the Japanese is shown in Fig. 5. The smaller end sits in the shoulder of the larger flange, and the space between is packed with round gasket material. When rosin is introduced, and the cordage well driven home, quite a secure joint results. The Japanese use the wet and dry systems of purifying. Slacked lime is used in the purifiers about 3 inches deep in trays. The lime absorbs sulphuretted hydrogen, ammonia and carbonic acid. After passing the purifier, the gas is in readiness for the holders. Instead of the telescope gasholders that one sees in the works of the American manufacturer of gas, cylindrical vessels of sheet iron arranged in a tank of stone or brick. The water is employed in the usual way. Pipes admit the gas between the top of the reservoirs and the surface of the water. The buoyancy of the gas raises the holder on pretty much the same plan as in the American gasholder. But the Japanese holders are smaller in size. I saw some very high grade gases in use and again some very poor grades. It is not unusual to find good gas so poorly employed that the flames are as in Fig. 6. I found gas pipe tips with round holes bored instead of slitted, so that the flame had the appearance of the unsteady jet in Fig. 6. Then I found tips so constructed that the light was considerably handicapped by splitting as in Fig. 7. Some of the imported tips in use were found to be in bad order, and making poor jets. Then again I noticed cases in which a correct flame was made as in Fig. 8. I am convinced that there is a very encouraging outlook for gas in Japan. The electrical light is there, but there is room for the gas light. The tallow dips, the inferior cocoanut oil lights, the lamps made from bottles for burning oil, etc., are fast giving place to the more improved, useful, neater, systems of gas lighting.

SPECIAL ENGLISH CORRESPONDENCE.

COMMUNICATED BY NORTON H. HUMPHRYS.

SALISBURY, ENGLAND, Sept. 9th, 1905.

Percentage of Storage.—More Evidence in Favor of Gas for Lighting. —Gas Managers and Commercial Travellers.

An interesting discussion took place at a recent meeting of the Irish Association of Gas Managers on the subject of the proper or safe provision that should be made in the way of gasholder capacity, stated as a proportion of the maximum 24 hours' consumption. The first thought suggested by such a subject is the paucity of any definite rules in respect to the leading features of gas works' construction. Every gas engineer has probably in his library a long shelf containing several volumes of "Proceedings" at Gas Association meetings. If anything like complete the number of books will run into three figures. And yet there is nothing definite as to the size of retorts, the area of condensing surface, the dimensions of washers and purifiers and the proper proportion of gasholder room. On these matters each individual follows his own ideas, and the leading dimensions in the gas works are matters of accident rather than design. In most cases the works have gradually grown from a small beginning, and enlargements are made after they are wanted rather than before, and in a fragmentary or piecemeal fashion. One year two or three beds of retorts are added, the next year a few pipes are put on to the condensers, the third a new set of purifiers are laid down, and so on, with the result that there is simply a very rough approximation between the make and the size of the apparatus. The chief difficulty is that the maximum make is an ever varying quantity. The maximum of to-day may be nearer the minimum of 10 years' time.

The most interesting feature brought out was the diversity of opinion as to what constitutes the most advantageous proportion. While one speaker was leading a happy life with 45 per cent., another was saving money on 125. Mr. R. B. Anderson, who opened the discussion, stated that the usual practice was 100 to 200 per cent. That as soon as the storage fell below the lower limit, a new holder equal to the total existing capacity was added. The holders were looked upon in times gone by not only as a means of covering the fluctuations in demand over 24 hours, but as a standby for tiding over breakdowns on the works. And he suggested, not only that the fluctuations over the 24 hours were now much reduced by reason of increased day consumption, but also that gas plant was now so far perfected that the "standby" factor might safely be eliminated. Instead of 100 to 200 per cent., he thought that 30 to 60 per cent. might be taken as a minimum, subject to some increase for special circumstances such as liability to fogs. The 60 per cent. appeared to act as a red rag, and in the subsequent discussion there was too much tendency to regard storage capacity as a fixed instead of a variable quantity. Gasholders cannot be built every year, so the prospective rate of increase is the first consideration where an enlargement is contemplated. One would like to have seen a sharper line drawn between the two functions of the gasholder—viz., as an equalizer and as a standby. The main facts were agreed upon. No one denied that the consumption over the 24 hours was more evenly distributed, or that gas apparatus was safer or more reliable. But the consensus of opinion gravitated towards the 100 per cent. proportion, and probably the real reasons for this are somewhat obscure. In the first place, gasholders are less costly than they used to be, and a very moderate saving in wording expenses will go a long way towards in-

terest and depreciation on capital. And then the question of proportion is not everything. For obvious reasons there should be at least two holders, and one of these should be large enough to run through a long winter evening without necessitating a change during the period of heavy consumption. In districts subject to frost there is an objection to uncapping a lift in the middle of the evening. In these days of gaseous fuel the economical generating unit, as represented by a single bed of retorts, the lowest quantity that can be taken up or let down is not a small one. Small holder capacity means either a small unit or idle retorts. The standby element may be negligible, but it is a great convenience to have a margin admitting of a fortnight or 3 weeks gaining or losing. So that altogether I think no gas engineer with a free choice would cut the storage much under 100 per cent. There may be reasons for making a virtue of necessity, and, of course, the individual characteristics of the district must be considered. But one cannot leave the subject without again expressing surprise that a subject such as the proportion of the storage capacity has not been brought down to fairly narrow limits long ago.

Last week I noticed the fact that some modern appliances in gas lighting were prominent features at the annual ironmongery and hardware exhibition in London, and now I am able to produce evidence to the effect that the use of gas for lighting purposes is increasing. The hardware trade has not looked with any great favor on gas lately. There is a little jealousy over the hiring and free fitting department, which is regarded by some as an unwarranted interference or competition. The fact that these departments are the result of necessity, rather than of choice, is not properly appreciated, nor is it recognized that gas companies have been compelled to cater for those who for one reason or another will do without gas rather than incur the expense of fittings. The bulk of the stoves supplied over here are placed with customers who would not have them on any other terms, and the same may be said as regards free fittings. In this connection it may be noticed that the Croydon Gas Company are initiating an arrangement which is the result of a conference between the representatives of the trade in the district and the directors, and which aims at conciliating the trade by enabling any ironmonger to become an agent for the sale of gas appliances. The result will be watched with interest, as the object of gas undertakings is to sell gas, rather than to run separate departments for the sake of increasing the profits, and probably there are few undertakings who would not be glad to hand over the whole of the stove and fitting department to any responsible party who would guarantee that it should be properly exploited. The present attitude of the trade appears to be favorable towards some kind of a mutual arragement. The last year or two has seen the introduction of a host of comparatively cheap accessories, the price of which is reckoned in shillings rather than pounds, and having sufficient intrinsic merit and attractiveness to command purchasers. The *Hardwareman* prophesies that the inverted incandescent gas burner will be the feature of the coming season's business, and will give a decided impetus to the trade. Hitherto the electric glow lamp has had the advantage in respect to artistic or ornamental methods of arrangement, but now it is evenly matched in those respects. Another prominent trade journal, the *Ironmonger*, says that there is very little doubt that the oil lamp is being ousted from the dining and drawing rooms of the middle and upper classes, and to nearly the same extent from the houses of the artisan section of the population. It is being ousted by electric light partly, but chiefly by gas—by the beauty and efficiency of the incandescent system in its various forms in the one case and by the simplicity, convenience and economy of the slot meter system in the other. The wheel of fortune may come round again, bringing prosperity to the oil lamp trade, but there is no sign of any such change at the moment, and he is indeed a sanguine man who expects any. These quotations may be accepted as independent evidence from people who have no interest in gas, but one concerned only with the sale of appliances.

The *Gas World* has provided its readers with a little light holiday reading on the subject of the commercial traveller and the gas manager, and representatives of both callings have been letting off a little surplus steam at the expense of the other. The matter orignated with a complaint in the correspondence columns, from a gentleman resident in a district that is also a railway center, and was to the effect that interviewing travellers was a serious inroad upon his time, and interfered with the proper discharge of other duties. He did not object to the visit of people dealing in gas works specialties, but his point was rather to the effect that agents for all sorts of things finding themselves landed with an hour to wait for a train, filled up that hour by a visit to the gas works. Naturally the knight of the road resented anything like an aspersion on the utility of their calling, and in reply did not hesitate to utter what they would probably call some home truths in respect to gas managers they had met. Reading between the lines, it is possible for gentlemen on either side of the counter to gather a useful hint or two. No doubt there is room for reasonable consideration on both sides. The travellers' business existance depends on his picking up orders, and that being so he would be more than human if his persistence did not at times get the better of his discretion. On the other hand the gas manager in these days has all sorts of duties to perform, and if he happens to be engaged on a particular job such as preparing a retort or getting out the annual statement of accounts it is rather hard to show an urbane countenance and courteous demeanor to the sixth interrupter, when his business proves to be of very slight if any importance. One suggestion brought out by the perusal of the discussion is whether the manager of a medium sized country works, doing anything between 50,000,000 or 200,000,000 per annum, has not too many irons in the fire. Usually he also acts as secretary or at least undertakes to some extent the control of accounts. He has to superintend several groups of workmen, including retort house hands, yardmen and laborers on the works, and mainlayers, lamplighters, fitters, inspectors, and probably also maintenance men in the district. All the complaints incidental to an extensive living business, in addition to questions of disputed meters, require his personal attention. And he also has to act as purchasing agent, subject to a greater or less extent to the control of a board of directors who look to him for advice as a technical expert. With so many engagements there will sometimes be bad day when discontented workmen, irate consumers, prospective customers and persistent drummers follow without intermission, one down the other up. It is easier to point out the trouble than to suggest a remedy, because what is too much for one is not necessarily enough for two.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

THE City Council, of Alma, Mich., has granted H. G. Bedford, of Grand Rapids; J. W. Robinson, of Alma, and their associates, a franchise to construct and operate a gas plant in Alma. Mr. Bedford is the auditor of the Michigan Trust Company, of Grand Rapids, and the owner of gas plants in Flint, Greenville and Hastings. A stock company will be organized and the plant is to be built in the early spring and completed within 18 months, according to contract. It is proposed to lay pipes to Ithaca and St. Louis, adjacent towns, supplying people there with light and heat. The towns are situated in a triangle, making this plan feasible.

THE J. H. T. Martin Co., of 198 Broadway, New York, is putting the Dorenbos gas arcs on the market. A full page description is to be found in our advertising columns.

A PART of the Glens Falls, N. Y., lighting has been awarded to the Hudson River Electric Company. The Glens Falls Gas and Electric Company would not bid on the section requiring wires to be placed under ground.

AT a meeting of the Board of Directors of the Washington (D. C.) Gas Light Company, held recently, the vacancy in the board caused by the death of James W. Orme, was filled by the election of John C. Poor.

MRS. EDWARD G. COWDERY, of St. Louis, formerly of Milwaukee, wife of Mr. E. G. Cowdery, General Manager of the Laclede Gas Company, of St. Louis, Mo., was severely injured in a stage coach accident in the Yellowstone Park recently, and is now at her home in St. Louis. Mrs. Cowdery was riding on the top seat of the stage coach, when one of the front wheels became loosened and the coach turned over. Her leg was broken in two places. We extend our sympathy to Mrs. Cowdery through Mr. Cowdery, and trust that no complications will arise to prevent his presiding at the American meeting.

THE Waterloo and Cedar Falls (Ia.) Gas and Electric Company are spending $50,000 on improvements to both plants. New holders will be installed.

THE Greensboro (Va.) Gas Company is spending $30,000 in improvements to its plant here. These improvements consist of a new gas bench, additional buildings and gas mains.

MR. GEORGE W. GRAVES having resigned his position with Abendroth Bros., gas range manufacturers, has been elected Vice-President of the Albany Foundry Company, and will have charge of the gas appliance department.

WRITE to the General Gas Light Company, of Kalamazoo, Mich., for a copy of its handsomely illustrated folder, cataloguing seven styles of the Humphrey gas arc lamps that are being put to practical and increasing use by about every gas company in the country.

THE Greenville, Okla., council has before it a proposition looking to the establishment of a gas plant in that town. It is said that a franchise can easily be secured if the promoters show the council that they mean business.

MR. H. L. DOHERTY, of Denver, Col., has patented a tar extractor.

THE whole of Kansas City, Mo., is now supplied with natural gas.

IN place of the 10 gas lamps of which they have been deprived, the residents of East Lansdowne, Pa., illuminated their thoroughfares with 500 candles. These substitutes for the street lights, which were deemed unnecessary expense, were placed on pointed sticks and stuck in the ground along the streets. However, the gas lights were continued by the gas company in spite of contrary instructions.

THE Mayor of Lexington, Ky., was authorized to sell a franchise to the highest and best bidder for the purpose of conducting natural gas through the streets and alleys of Lexington, by the passage of an ordinance by the General Council.

ENSLEY, ALA., will be supplied with gas piped from Birmingham.

THE Vice-Chancellor at Atlantic City, N. J., dismissed the suit of the old company and allows the new company to proceed with its work of laying pipes in Atlantic City and completing its system. The new company was, however, held in contempt of court for laying mains after the injunction was served and was fined $25.

THE Suffolk County Lighting Company to make and sell gas and electricity and supply steam in Suffolk and Nassau counties, N. Y., has filed articles of incorporation.

THE Empire Gas Improvement and Construction Company, of New York City, were awarded the contract for the additions and improvements to the Guelph, Can., gas plant. There were 4 tenders, but the New York company was the lowest, their estimate being $58,382. The other figures were: Canadian Gas Apparatus and Construction Company, Windsor, $64,000; Economical Gas Apparatus Construction Company, $66,153; John Coates & Company, London, Eng., and Ottawa, $68,875. Mr. Isaac C. Baxter, the engineer employed by the committee to prepare the plans and estimates, was present. Mr. Baxter was retained as engineer to supervise the work of construction. The improvements will be started at once and the contract calls for the completion of the work by May 15th, 1906.

THE gas franchise of Monrovia, Cal., which was advertised for sale under the recent act of the Legislature governing the bestowal of such privileges, has been sold to H. Kerchenschalger for $50. He is the President of the Peoples Gas Company. The gas mains of this corporation were already down and the Campany was in shape to sell gas before the privilege was obtained. This is probably one of the first franchises ever sold under this law. The merely nominal price that was paid was accepted because it is the opinion of the Monrovia attorney that any company could easily evade the law because of its peculiar wording.

The Greenwich, N. Y., trustees have signed a franchise giving to Eugene E. Dunbar and John R. Dawson of Boston, and Brodie G. Higley, of Sandy Hill, the right to erect and maintain a gas plant, lay pipes, etc., in that village. The franchise specifies that work must be begun within 1 year, and gas furnished within 2 years. It is said that the concern, which will be known as the Greenwich Gas Company, will begin work on its plant at once. The men interested have gas plants in several towns in this section of New York State. They have recently completed one at Bennington, Vt.

FRANK M. GREGG, President of the Cleveland Street Lighting Company, who represents the Cleveland syndicate that is seeking a "dollar gas" franchise in Omaha, appeared at the City Council meeting Thurs. day Sept. 15th, and presented each councilman individually with a copy of the franchise ordinance he will ask them to give him, in the name of "Frank M. Gregg, his successors and assigns," and a statement of its salient features paralleled with a like statement of the salient features of the present gas company's franchise—the purpose being to show the advantages that will accrue to the city and consumers in the new franchise. Mr. Gregg was not given the opportunity of appearing before the councilmen collectively, and when the matter came up for discussion there were only a few more than a Corporal's guard present.

THE Bellows Falls and North Walpole (Vt.) Gas Company, has been granted the right to lay its pipes through the streets, etc. This Company was incorporated in July with a capital stock of $50,000 and the question of granting a franchise has been before the bailiffs during the past month. Bailiff J. J. O'Connor refuses to sign the franchise unless the question of granting it were brought before the voters of the village in a village meeting, therefore the franchise bears the signature of only two of the bailiffs, Dr. O. M. George and A. L. Field. Dr. George was one of the incorporators of the Company and also a stockholder. Before signing the franchise he disposed of his stock and resigned trom the Company.

A NEW type of incandescent mantle is disclosed in an English patent just issued to two Viennese inventors. The foundation or "fabric" of the mantle is produced from spun quartz, and impregnated with the usual rare earths. It is translucent, and possesses great durability at high temperatures. Pure quartz is melted in an electric furnace and a fine thread spun in the same manner as is followed in producing glass wool or the like. As the thread is produced it is wound on a large drum and allowed to cool very slowly, giving an opportunity for crystallization to take place without causing undue stresses, which are liable to result in an unstable, brittle product. The thread thus produced is afterward woven into the mantle fabric, which is given the proper forming or shaping in a high pressure gas flame. The deposition of the rare earths upon this form is accomplised subsequently.

THE ukase of the Czar ordering a change in the rates of duty upon importations from the United States affects a pretty wide range of articles. Among these, in general classification, are resins and tars. finished and unfinished cast iron, wrought iron and steel and their manufactures. The latter include boilers and engines, tools, sewing machines, traction machines, gas and water meters and a multitude of other products of our workshops. These articles which under the retaliatory tariff have been subjected to duties practically prohibitory, are now importable under the general European rates of duty, and even as from the "most favored nation," as in the recent Russo-German commercial treaty arrangement.

THE Directors of the Cambridge (Mass.) Gas Light Company have voted that on and after January 1, 1906, the price of gas to consumers shall be $1.10 per 1,000 feet, with a discount of 20 cents per 1,000 feet if the bill is paid before the 10th day of the month. At present the rate is $1.10 per 1,000 feet, with a discount of 10 cents for prompt payment.

FOLLOWING up the recent purchase of the plant and property of the Gas Company, of Westchester, Pa., the C. H. Geist Company, of Philadelphia, has purchased the Downingtown Gas Company's plant, and will take possession of the same in a short time. These new owners, it is said, will make a number of improvements in the service in Downingtown, it being intimated that in the near future the gas will be manufactured at the West Chester plant, and piped to Downingtown patrons. The Company, it is understood, will spend a large amount of money in increasing the capacity of the plant here, not only for that purpose, but for expected increase in patronage in West Chester, as the quality of the gas is to be improved, and many new gas mains laid to all sections not now covered.

THE Milwaukee (Wis.) Coke and Gas Company has given a trust mortgage upon its Milwaudee plant to the Milwaukee Trust Company for $1,000,000. It was stated at the office of Ferdinand Schlesinger, the local head of the Company, that the money had been secured by the Company for use in making its present large addition to the coke ovens at its plant. The property on which the mortgage has been given is the extensive plant at the foot of Greenfield avenue. Included in the improvements now under way at the plant is the largest and most complete carrying crane system in the world.

R. B. HUNTER, of Seattle, is preparing to go ahead with the work on the gas plant at North Yakima, Wash., notwithstanding the fact that his franchise was revoked by the Council at its last meeting.

THE AMERICAN GAS LIGHT JOURNAL

A. M. CALLENDER & CO.,
PROPRIETORS.

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NOTIFICATION RESPECTING ADVERTISING.

Orders for new advertising, or for changes in standing advertisements, to insure attention in the issue following their reception, must be in hand any time of Wednesday.

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New York—American News Co., 39 and 41 Chambers St.
Germany—Lemcke & Buechner, of New York.
England—Aug. Siegle, 30 Lime Street, London.

MONDAY, SEPTEMBER 25, 1905.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

16 WALL STREET, NEW YORK CITY.

SEPTEMBER 25.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share.

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked.*
Conolidated. .. .. s.....	$75,177,000	100	180¼	181¼
Central Union, Bonds, 5's .	3,000,000	1,000	108	110
Equitable Bonds, 6's.....	1,000,000	1,000	..	109
" 1st Con. 5's.....	2,500,000	1 000	118	120
Mutual.....	3,500,000	100	275	290
Municipal Bonds.....	750,000	..	..	..
New Amsterdam Gas Co..				
Bonds, 5's	11,000,000	1,000	111	114
New York & Richmond Gas Co. (Staten Island).....	1,500,000	100	37	43
1st Mtg. Gold Bds. 5 p. ct.	1,000,000	..	98	104
Northern Union, Bonds, 5's.	1,250,000	1,000	105	107
New York and East River..				
Bonds 1st 5's.....	3,500,000	1,000	112	114
" 1st Con. 5's.....	1,500,000	..	106¼	108¼
Standard.....	5,000,000	100	140	160
Preferred.....	5,000,000	100	155	175
Bonds, 1st Mortgage, 5's	1,500,000	1,000	111	114
Yonkers	999,650	500	130	..
Out-of-Town Companies.				
Brooklyn Union	15,000,000	100	190	190
" " Bonds (5's)	15 000,000	1,000	113	115
Bay State.....	50,000,000	50	3/16	¼
" ncome Bonds.....	2,000,000	1,000	..	75
Binghamton Gas Works....	450,000	100	..	65
" 1st Mtg. 5's.....	500,000	1,000	75	100
Boston United Gas Co.—				
1st Series S. F. Trust....	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47¼	50
Buffalo City Gas Co.	5,500,000	100	6	7
" " Bonds, 5's	5,250,000	1,000	75	80
Capital, Sacramento.....	500,000	50	..	35
Bonds (6's).....	150,000	1,000	..	..
Chicago Gas Co. Guaranteed Gold Bonds.....	7,850,000	1,000	104	104¼
Cincinnati Gas and Electric Co	29,500,000	100	106⅝	106⅞
Columbus (O.) Gas Co., 1st Mortgage Bonds.....	1,500,000	1,000	90	..
Columbus (O.) Gas Lt. & Heating Co.....	1,682,750	100	..	95
Preferred.....	3,096,500	100	107¼	108
Consumers, Toronto.....	,000,000	50	200	204
Consolidated, Baltimore....	11,000,000	100	85½	87
Mortgage, 5's.....	3,600,000	..	..	118
Chesapeake, 1st 6's.	1,000,000	..	..	..
Equitable, 1st 6's.	910,000	..	..	..
Consolidated, 1st 5's....	1,490 000	..	..	112
Consolidated Gas Co. of N.J.	1,000,000	100	15	17
" Con. Mtg. 5's.....	880,000	1,000	92	95
Bonds.....	75,000	..	..	100
Detroit City Gas Co.....	4,825,500	50	..	50
" Prior Lien 5's.....	5,803,000	1,000	..	98
Detroit Gas Co., 5's....	281,000	1,000	75	80
" Inc. 5's.....	16,000	100	98¼	100
Equitable Gas & Fuel Co., Chicago, Bonds.....	2,000,000	1,000	..	101
Essex and Hudson Gas Co.	6,500,000	..	39	40
For Wayne	2,000,000	..	..	..
" Bonds.....	2,000,000	..	55	..
Grand Rapids Gas Lt. Co. 1st Mtg. 5's.....	1,225,000	1,000	104½	105
Hartford	750,000	25	190	200
Hudson County Gas Co., of New Jersey.....	10,500,000	..	110	112
" Bonds, 5's.....	10,500,000	..	116	116½
Indianapolis.....	2,000,000	..	60	70
" Bonds, 5's.....	2,650,000	..	104½	105
Jackson Gas Co.....	250,000	50	82	..
" 1st Mtg. 5's.....	200,000	1,000	97	100
Kansas City Gas Light Co., of Missouri.....	5,000,000	100	..	36
Bonds, 1st 5's.....	3,322,000	1,000	102	104
Laclede, St. Louis	10,000,000	100	.	
Preferred.....	2,500,000	100	95	100
Bonds.....	10,000,000	1,000	108½	109
Lafayette Gas Co., Ind.....	1,000,000	100	..	60
Bonds.....	1,000,000	1,000	60	65
Louisville.....	2,570,000	50	143	145
Madison Gas & Elec. Co.				
" 1st Mtg. 6's.....	350,000	1,000	106	108½
" 6 per cent. scrip, due 1910.....	100,000	25	85	87
Montreal, Canada	2,000,000	100	218	218¾
Nashville Gas Lt. Co.....	1,000,000	100	110	..
Newark, N. J., Con. Gas Co.	6,000,000	..	56	58
Bonds, 6's.....	4,600,000	..	137	138
New Haven.....	2,000,000	25	200	..
Peoples G. L. & Coke Co., of Chicago.....	25,000,000	100	104¼	104¼
Peoples Gas Lt. & Coke Co., Chicago, 1st Mortgage....	20,100,000	1,000	..	..
2d "	2,500,000	1,000	104	..
Rochester Gas & Elec. Co..	2,150,000	50	88	..
Preferred.....	2,150,000	50	118	..
Consolidated 5's.....	2,000,000	..	104½	105¼
San Francisco, Cal.	15,800,000	100	58½	58¾
St. Joseph Gas Co.				
" 1st Mtg. 5's.....	751,000	1,000	92	..
St. Paul Gas Light Co.....	1,500,000	100	45	47
1st Mortgage 6's.....	650,000	1,000	113	116
Extension, 6's.....	600,000	1,000	113½	116
General Mortgage, 5's..	2,465,000	1,000	96¼	..
Syracuse, N. Y.	1,975,000	100	50	55
Bonds.....	2,047 000	1,000	102	..
Washington, D. C	2,800,000	20	212¾	213¼
First mortgage 6's.....	600,000	..	..	..
Western, Milwaukee.....	4,000,000	..	..	..
Wilmington, Del.....	600.000	50	230	..

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DIVIDEND NOTICE.

OFFICE OF THE UNITED GAS IMPROVEMENT CO.,
N. W. CORNER BROAD AND ARCH STS.,
PHILADELPHIA, PA., Sept. 13, 1905.

The Directors have this day declared a quarterly dividend of 2 per cent. (one dollar per share), payable Oct. 14th, 1905, to stockholders of record at the close of business, September 30, 1905. Checks will be mailed.

1580-4 LEWIS LILLIE, Treasurer.

NOTICE!

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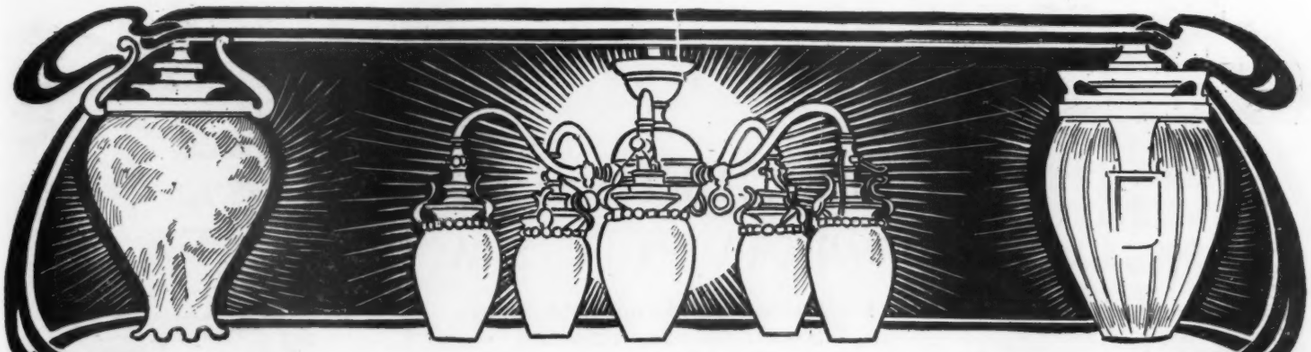

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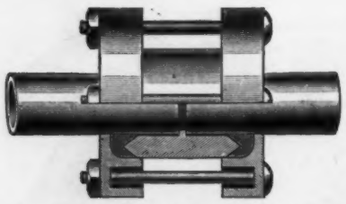
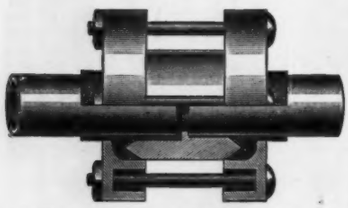
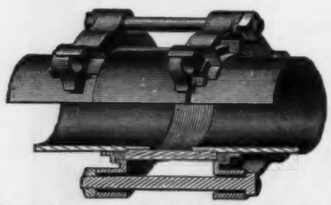


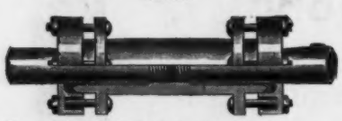
Regular Coupling, Style 1, for Plain End Wrought Iron Pipe.



Insulating Coupling, Style 5, for Plain End Wrought Iron Pipe.



Clamp, Style 4, for Repairing Leaks on Screw Collar.



Long Sleeve, Style 2, for Mending Broken Lines.

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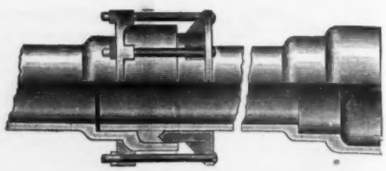
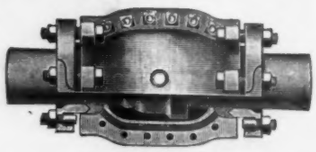
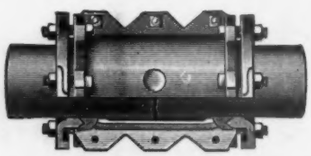


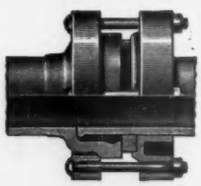
Coupling, Style 9, for Special Style Cast Iron Pipe.



Split Sleeve for Repairing Broken Bell on Cast Iron Pipe.



Split Sleeve for Repairing Broken or Cracked Cast Iron Pipe.



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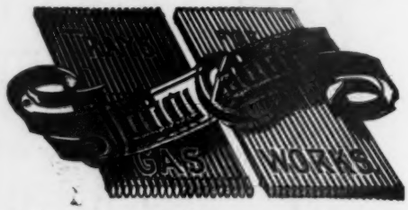

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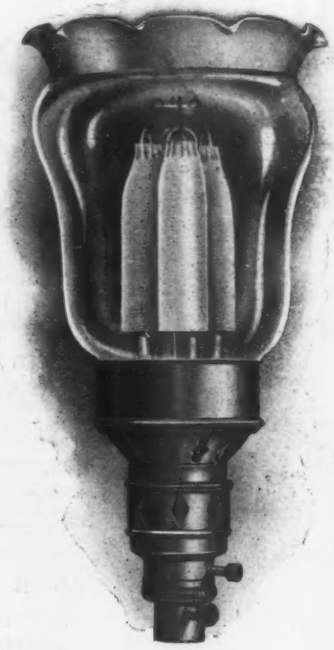

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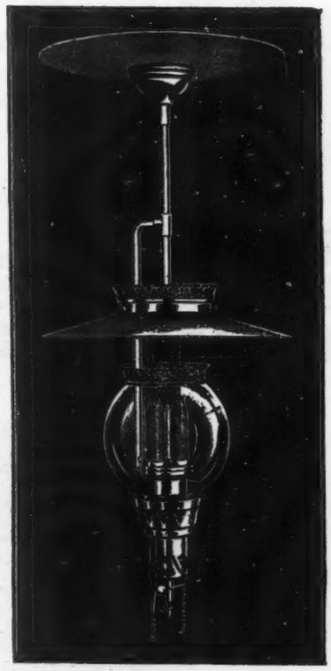

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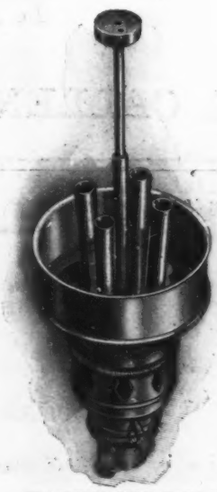

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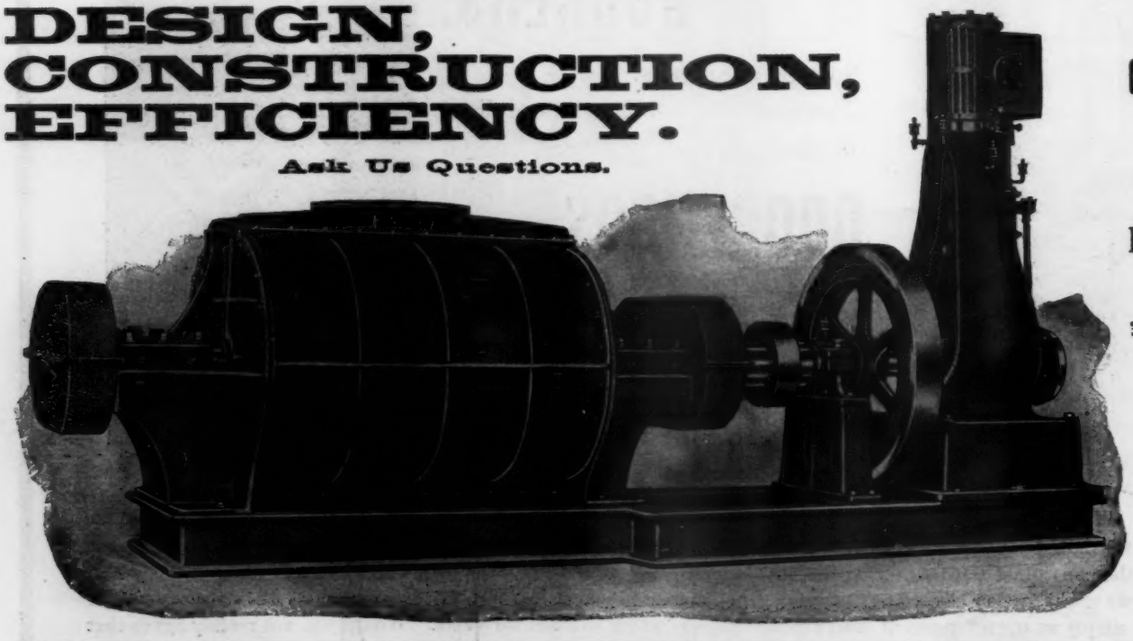

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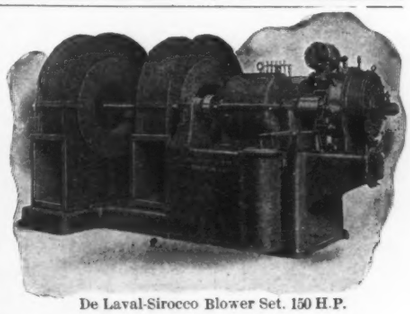

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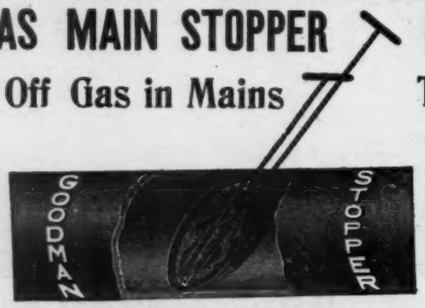

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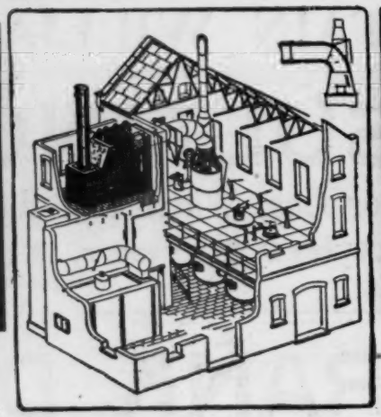

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PUBLIC LIGHTING TABLE.

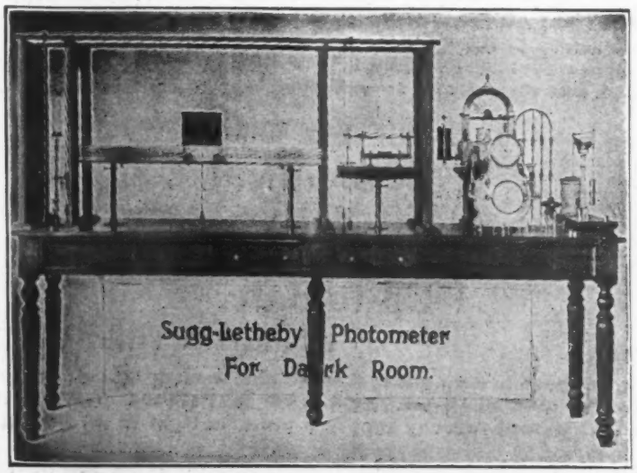
OCTOBER, 1905.

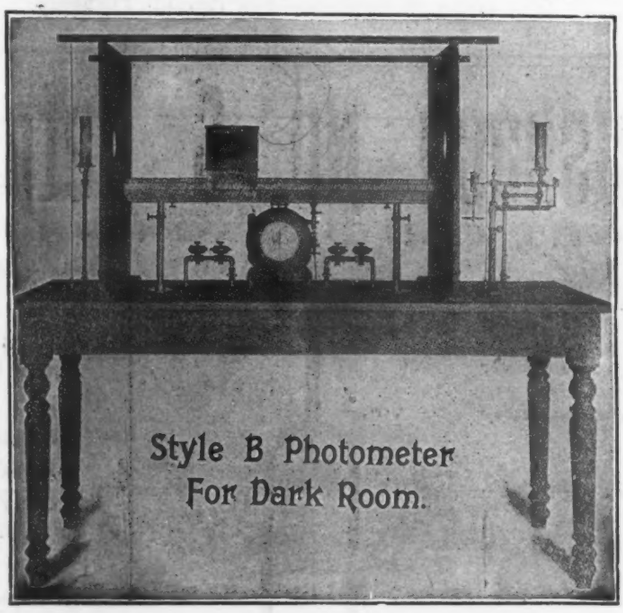
Day of Week.	Date.	Table No. 1. FOLLOWING THE MOON. Light.	Extinguish.
Sun.	1	6.10 PM	5.00 AM
Mon.	2	6.10	5.00
Tue.	3	8.30	5.00
Wed.	4	9 20	5.00
Thu.	5	10.20 FQ	5.00
Fri	6	11.20	5.00
Sat.	7	12.20 AM	5.00
Sun	8	1.20	5.00
Mon.	9	2.10	5.00
Tue.	10	3.10	5.00
Wed.	11	No L.	No L.
Thu.	12	No L. FM	No L.
Fri.	13	No L.	No L.
Sat.	14	5.50 PM	7.20 PM
Sun	15	5.50	7.50
Mon.	16	5.50	8.30
Tue.	17	5.50	9.10
Wed	18	5.50	9.50
Thu.	19	5.50	10.40
Fri.	20	5.50	11.30
Sat.	21	5.50 LQ	12.30 AM
Sun.	22	5.40	1.30
Mon.	23	5.40	2.40
Tue.	24	5.40	5.20
Wed.	25	5.40	5.20
Thu.	26	5.40	5.20
Fri.	27	5.40 NM	5.20
Sat.	28	5.40	5.20
Sun.	29	5.30	5.30
Mon.	30	5.30	5.30
Tue.	31	5.30	5.30

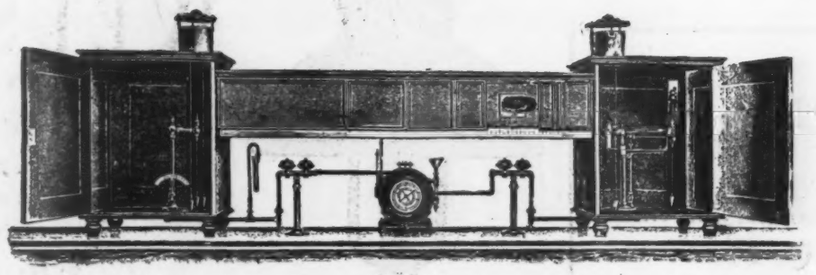
TOTAL HOURS DURING 1905.

By Table No. 1.

	Hrs.Min.
January	240.50
February	192.20
March	207.00
April	175.10
May	161.00
June	139.50
July	149.00
August	161.50
September	173.00
October	205.00
November	211.00
December	229.00
Total, yr.	2245.00







Closed Photometer For Light Room.

CIRCULARS SENT ON REQUEST.

PUBLIC LIGHTING TABLE.

OCTOBER, 1905.

Day of Week.	Date.	Table No. 2. NEW YORK CITY. ALL NIGHT LIGHTING. Light.	Extinguish.
		P. M.	A.M.
Sun.	1	5.30	5.00
Mon.	2	5.30	5.00
Tue.	3	5.30	5.00
Wed.	4	5.30	5.00
Thu.	5	5.30	5.00
Fri.	6	5.30	5.00
Sat.	7	5.30	5.00
Sun.	8	5.20	5.10
Mon.	9	5.20	5.10
Tue.	10	5.20	5.10
Wed.	11	5.20	5.10
Thu.	12	5.20	5.10
Fri.	13	5.20	5.10
Sat.	14	5.20	5.10
Sun.	15	5.10	5.20
Mon.	16	5.10	5.20
Tue.	17	5.10	5.20
Wed.	18	5.10	5.20
Thu.	19	5.10	5.20
Fri.	20	5.10	5.20
Sat.	21	5.10	5.20
Sun.	22	5.00	5.30
Mon.	23	5.00	5.30
Tue.	24	5.00	5.30
Wed.	25	5.00	5.30
Thu.	26	5.00	5.30
Fri.	27	5.00	5.30
Sat.	28	5.00	5.30
Sun.	29	4.45	5.35
Mon.	30	4.45	5.35
Tue.	31	4.45	5.35

TOTAL HOURS DURING 1905.

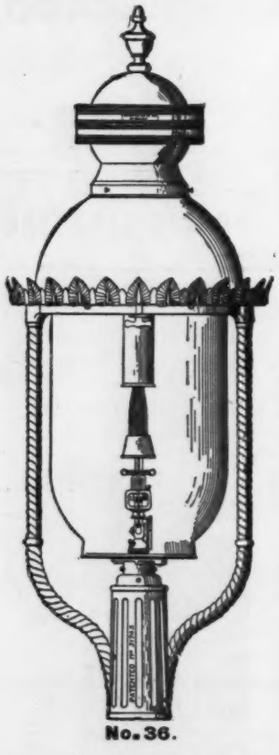
By Table No. 2.

	Hrs.Min.
January	423.20
February	355.25
March	355.35
April	298.50
May	264.50
June	234.25
July	243.45
August	280.25
September	321.15
October	374.30
November	401.40
December	433.45
Total, yrs.	3987.45

NEW YORK, 97 Liberty Street. BOSTON, 814 Beacon Building. PHILADELPHIA, Broad and Arch Streets. ST. LOUIS, 712 Roe Building. CHICAGO, Foot of Orleans Street. SAN FRANCISCO, 712 Polk Street.

WELSBACH STREET LIGHTING COMPANY

.... OF AMERICA ....



No. 36.

Controls and Operates the

Welsbach System of Street Lighting,

Which includes its specially DESIGNED AND PATENTED BURNER for STREET and PARK LIGHTING exclusively.

Uniformly SUCCESSFUL in 150 Cities and Towns.

By means of the Welsbach System of street lighting the superiority of GAS over electricity for street lighting has been fully demonstrated.

POINTS OF MERIT:

It is { Economical, Attractive, Successful, Up-to-date.

IT LIGHTS THE STREET.

Where there are no gas mains we can furnish an equally good light by our SELF-GENERATING NAPHTHA WELSBACH BURNER, and thereby supply a uniform light in all localities.

Correspondence Solicited from Gas Companies and Others interested in Municipal and Outside Lighting.

No. 38.

The Welsbach No. 6 Harp Fixture.

AN IDEAL LIGHT FOR DINING OR LIVING ROOMS.

THE HIGHEST MECHANICAL INGENUITY COMBINED WITH ORNAMENTAL BEAUTY--THE NEWEST OUTPUT FROM THE WELSBACH FACTORIES.

Equipped with new model No. 66 high candle power Welsbach Burner.

Side Pilot By-pass Tube covered with refractory sleeve to prevent bending.

Fourteen-inch Opal Dome Shade.

Polished Brass Embossed Crown 2¼ inches high.

Length of Fixture, 30 inches.

Width of Harp, 4½ inches.

Finished in Polished Brass.

Packed One Dozen to the Case.

List Price, per Dozen, $45.00.

We recommend equipping the No. 6 Harp Fixture with No. 4197 Intensive Brand Mantle, and the No. 306 **F. Q. M.** Clear Glass Air-Hole Cylinder.

Although the 14-inch Opal Dome Shade is standard equipment, we are prepared to furnish Dome Shades in green, pink or yellow (opal lined), and will be glad to quote prices.

WELSBACH CO.,

Salesrooms in all the principal cities of the United States.

Factories:
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CHICAGO, ILL.

THE UNITED GAS IMPROVEMENT COMPANY

For the Period Ending July 1st, 1905, has been Awarded Contracts for 32 Sets of

Standard Double-Superheater Lowe Water Gas Apparatus.

PARTIAL LIST OF PLACES:

Catasauqua, Pa.	**Hempstead, N. Y.** (2d contract).	**Amsterdam, N. Y.**
Plattsmouth, Neb.	**Lansdale, Pa.**	**Houston, Tex.** (2d contract).
Detroit, Mich. (2d contract).	**New Britain, Conn.**	**Hamilton, O.** (2d contract).
Springfield, Ills.	**Ludington, Mich.**	**Indianapolis, Ind.** (2d contract).
Oneonta, N. Y. (2d contract).	**New York,** Mutual Co. (2d contract).	**Hazleton, Pa.**
Pottsville, Pa. (2d contract).	**St. Louis, Mo.** (4th contract).	**Mahanoy City, Pa.**
Evansville, Ind. (2d contract).	**Sioux City, Ia.** (3d contract).	**Nanticoke, Pa.**

TOTAL SETS TO JULY 1ST, 1905, ... 585
TOTAL DAILY CAPACITY TO JULY 1ST, 1905, . 455,980,000 CU. FT.

The United Gas Improvement Company,

Broad and Arch Streets, Philadelphia.

Established 1858. Incorporated 1890.
CHAS. E. GREGORY, Prest. DAVID R. DALY, V.-Prest. & Treas.
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MANUFACTURERS OF

CLAY GAS RETORTS, FIRE CLAY TILES,
FIRE BRICK and FIRE CLAY SPECIALTIES.

Ground Fire Clay, Fire Sand and Ground Fire Brick in Barrels and Bulk.

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FLEMMING GENERATOR GAS FURNACE

Brooklyn Fire Brick Works,

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NATIONAL PYROGRANIT COMPANY,

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Established 1846.

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Manhattan Fire Brick and Enameled Fire Clay Retort Works.

Works at Weber, on the Raritan River, Middlesex County, New Jersey.
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Modern Coal Gas Benches,

With either Horizontal or Inclined Retorts, Half-Depth and Full-Depth Recuperative Furnaces.

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STANDARD BENCH IRONWORK.

Linings for Water Gas Apparatus, High Grade Fire Brick of All Shapes and Sizes, Ground Fire Clay, Ground Fire Brick in Bulk or in Barrels.

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Works.
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Fire Brick, Tiles, Etc.

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In Kegs, 100 to 200 " " 6 " "
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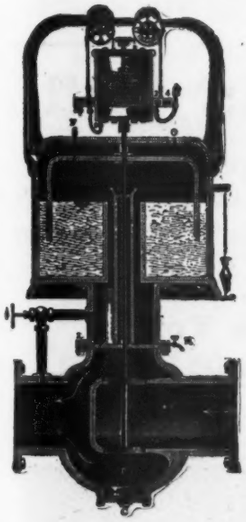

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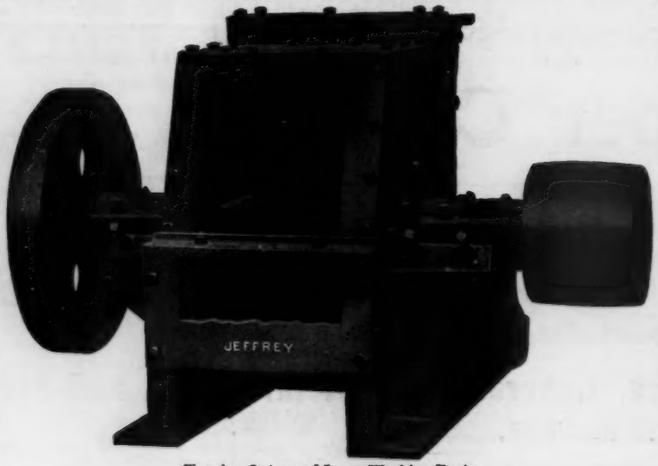

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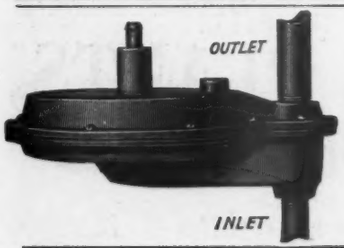

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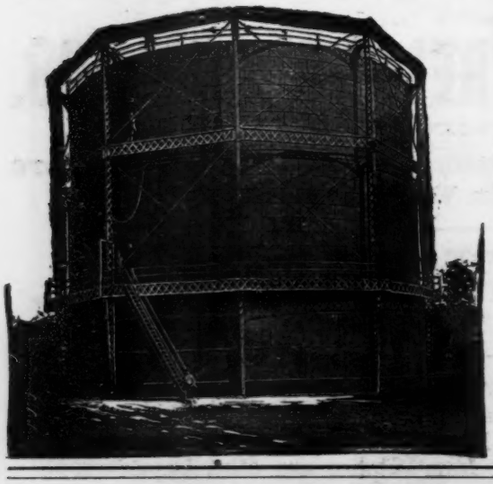

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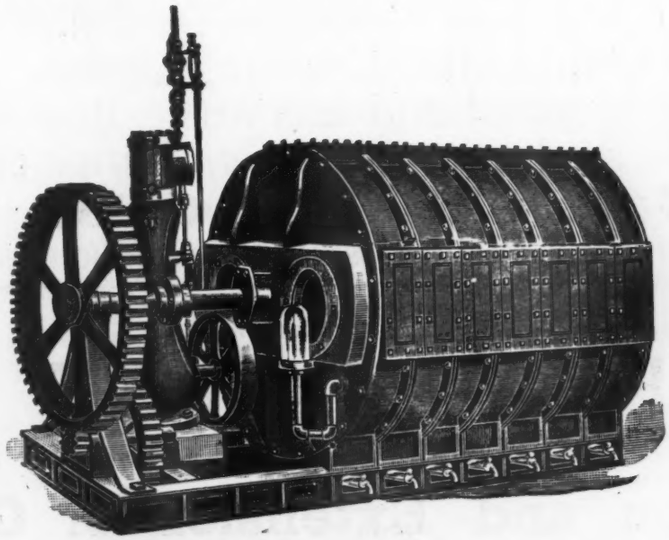

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The best apparatus for the extraction of all Ammonia and a large proportion of Carbonic Acid and Sulphureted Hydrogen. The Scrubber has been materially improved and is provided with patented Wooden Segmental Grids, instead of Metallic Discs, thus reducing the weight on shaft and power for operating same.

Coal and Water Gas Installations of the Most Modern and Complete Types.

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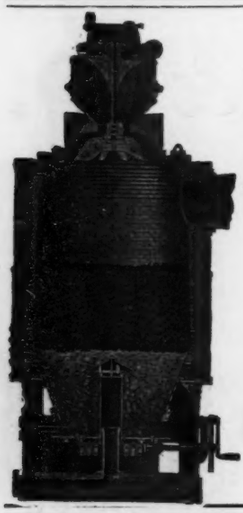

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The best Producers for either Bituminous, Anthracite Coal or Lignite. Less labor required and less waste than in any other Producer. Send for Pamphlet. : : : :

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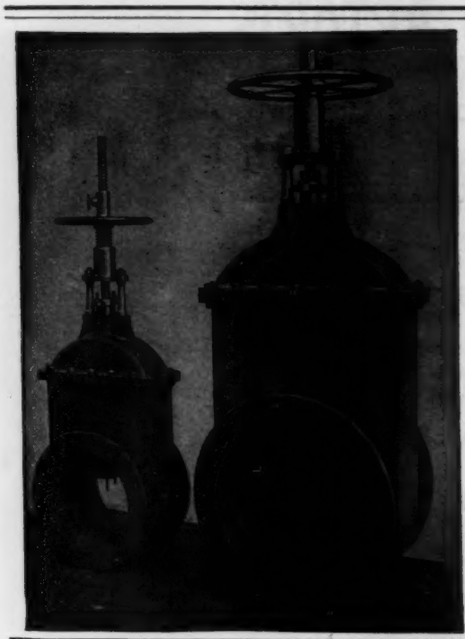

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These valves are provided with double discs or gates, and are tight with the gas pressure on either side of them.

The discs are so arranged as to be free from their seats when being opened or closed, and are operated by a quick-acting mechanism. The valve stem extends outside of the bonnet, and serves as an index, showing whether the valve is closed or open, and the amount of opening. They are made of the following dimensions:

Size.	8 Inches.	10 Inches.	12 Inches	16 Inches.	20 Inches.	24 Inches	30 Inches.	36 Inches.
Diameter of flanges.....	13 inches	16 inches.	18 inches	22½ inches.	27 inches.	31 inches.	38 ½ inches	44 inches.
Face to face of flange...	12 inches.	12 inches.	12 inches	14 inches.	17 inches	20 inches	21 inches.	23⅝ inches.

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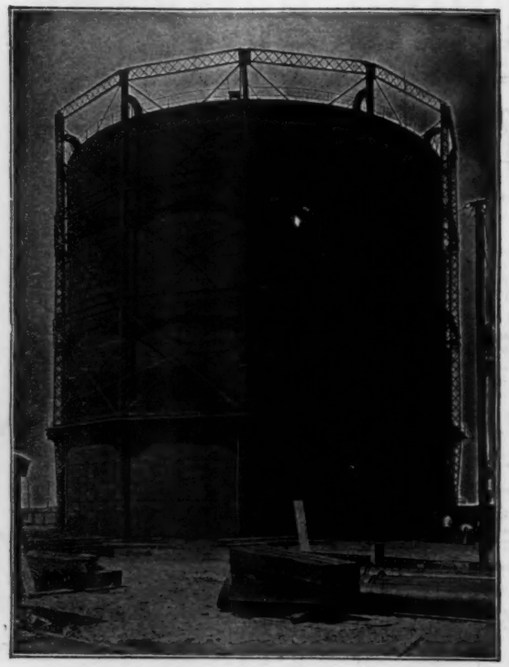

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Dear Sir: I am in receipt of a copy of "Excerpts from the Decisions of the Board of Gas Commissioners," which is a handy compilation in book form of extracts from the most recent decisions of the Gas Commission of Massachusetts.

I note that most of these extracts are broad and safe-guiding precepts, which apply with equal force to one Company as to another. The 13 years' existence of the Board of Gas Commissioners, with its unusual opportunities for acquiring information, have justly made it a high and safe authority in all matters pertaining to the management, obligations and rights of Gas Companies. Your little book will serve as a valuable reference library in settling legal complications which often arise between a Gas Company and its customers.

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BEFORE.

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AFTER.

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